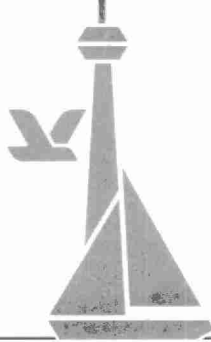


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# METRO TORONTO

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## REMEDIAL ACTION PLAN

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### Draft Discussion Paper On Remedial Options

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paper*

Remedial Action Plan  
Plan d'Assainissement

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# Remedial Action Plan Plan d'Assainissement

Metro Toronto

April 11, 1990

Dear RAP Participant:

In September 1988 the RAP team released its draft Stage 1 Report entitled "Existing Conditions and Problem Definition". Since that time, the RAP has established a Public Advisory Committee (PAC), which has been meeting monthly since March of 1989, and a Technical Advisory Committee (TAC). Work has now been completed on the preparation of the "Draft Discussion Paper on Remedial Options".

The next phase of the RAP process will involve review and discussion of remedial options. Briefing sessions have been scheduled to begin this process. Information on the dates and locations of these sessions is enclosed.

Over the past 18 months, there have been a number of interesting initiatives concerning the environmental quality of the Toronto area which are related to our RAP. These include:

- the publication of the Greenspace Strategy for the greater Toronto region by the Metropolitan Toronto and Region Conservation Authority.
- the expansion of the Royal Commission on the Future of the Toronto Waterfront's (Crombie Commission) mandate to a provincial, as well as federal undertaking.
- the establishment of a task force (Kanter Task Force) to report on the protection of the river valleys of the Greater Toronto Area.
- an environmental audit of the eastern port industrial lands of the Toronto waterfront by the Royal Commission, with the support of Environment Ontario and Environment Canada.
- the establishment of a major urban park in the Rouge River of Metro Toronto by the Provincial Government, with support of the Federal Government.

Canada  Ontario

Canada-Ontario Agreement Respecting Great Lakes Water Quality  
L'Accord Canada-Ontario relatif à la qualité de l'eau dans les Grand Lacs

We are heartened by these initiatives, and others, for several reasons.

First, they reflect a significant institutional interest in the improvement of the environmental quality of the Toronto Area.

Secondly, all these initiatives will focus on very important aspects of the "Metro Toronto Area Ecosystem".

Thirdly, these initiatives will serve to create and mobilize greater public interest which will benefit the RAP.

While the specific goals of these initiatives vary, they will contribute to the improvement of the water quality in the Metro Toronto RAP area and more importantly, secure improvements into the future. Taken together, these initiatives, along the Metro Toronto RAP, provide the basis for "an ecosystem approach" by which to improve the environmental quality of the Toronto Area. The Metro Toronto RAP Team, working with the Public Advisory Committee will strengthen this development as we proceed with the RAP process.

Sincerely,

A handwritten signature in black ink, appearing to read 'Doug Andrews', followed by a long horizontal line.

Doug Andrews  
Metro Toronto RAP Coordinator

On behalf of the Metro Toronto RAP Team

**METRO TORONTO REMEDIAL ACTION PLAN**

**DRAFT DISCUSSION PAPER**

ON

**REMEDIAL OPTIONS**

April 1990



## FOREWORD and CONTEXT

This discussion paper is being made available as part of the ongoing consultation being conducted as part of the RAP development process. RAP consultation has involved many individuals from diverse backgrounds to date. The contents of the paper are the result of consultants reports, subcommittee and workshop discussions. Informal discussions with public groups active on the Public Advisory Committee or involved in other environmental forums have generated or modified sections of this paper.

The release of this paper is intended to stimulate debate and generate suggestions for improving and supplementing the array of options to be considered. The discussion paper is being released now, in order that comments can be received prior to discussions relating to option selection, prioritization, scheduling and financing. Various opportunities for input are being provided. The Public Advisory Committee and its Sector Subcommittees are directly involved in a consensus building effort to advise the RAP Team of community-wide desires pertaining to option selection. There are other opportunities to influence the RAP. The Royal Commission on the Future of the Toronto Waterfront will conduct public hearings entitled "Environment and Health (continued)" beginning May 22, 1990, at which time comment can be made regarding this paper and the RAP process. Anyone wishing to make submissions at these hearings, must advise the Royal Commission in writing by Friday, May 11, 1990. The RAP will monitor these hearings and the Royal Commission will report on them in their next Interim Report.

### Context and Limitations

This paper is intended to provide information to many audiences and has been designed with a set of diverse needs in mind. To succeed, the RAP will require strong support from public sectors, staff in all levels of government, and from elected representatives. In order to build consensus among the many interests participating in the RAP process, both basic and detailed information is needed.

The RAP is committed to an ecosystem approach. It also must act within the current jurisdictional framework of responsibilities, for the present. The thrust of the RAP in seeking to achieve its ecosystem objectives will be to attempt firstly to ensure a consistency of effort towards remedial actions across all jurisdictions. Since most agencies do not operate on an ecosystem basis, the description of the programs being conducted by agencies is not ecosystem oriented. The basis for the ecosystem approach lies in the breadth of actions and programs to be incorporated in the RAP and the manner in which they are implemented. This paper should therefore be considered as an integrated whole rather than on the basis of a single program or set of programs. **The question to be answered is whether the options provided would form a sound basis for ecosystem management if adopted and implemented in a comprehensive fashion.**

Virtually all agencies with a water quality responsibility within the RAP area have provided input on the status of existing programs. Programs and resource allocations change from year

to year however, and in some instances improvements will have been made which have not been documented. This paper is truly a "draft for discussion" and it is intended that corrections and additions will be made as a result of discussions.

Numerous potential improvements are cited under the various options. There has been no opportunity provided to either agencies or the public to comment on these in advance. The benefit of this is that possible improvements will be considered by all, on an equal basis.

**Inclusion of a potential improvement in this document does not constitute endorsement or agreement by the responsible agencies.** Commitments will be sought as part of the RAP process, but only after all affected parties have been given the opportunity to discuss the options available and their ecological, social, economic and technical merits.

### **Format**

This paper has been organized on the basis of public and technical input provided at a workshop held by the RAP in October of 1988. A workplan was produced in January of 1989 which laid the pattern for this report. The workplan was reviewed by the PAC and the TAC.

The basis for the layout is seven "Remedial Intents". An effort to achieve each of these intents will produce a plan which will further the process of remediation. How far the RAP pursues each, will be one of the subjects for discussions during the option selection process. The seven Remedial Intents are:

- o Implement Specific Plans to Correct Localized Use Impairments
- o Reduce the Impacts of Treated and Untreated Sanitary Sewage
- o Reduce the Impact of Dry Weather Sources
- o Reduce the Impacts of Stormwater Runoff
- o Increase Public Awareness and Public Involvement in Environmental Programs
- o Foster Ecosystem Thinking Both Within and Outside the Metro Toronto RAP
- o Conduct Research in Support of Short and Long Term RAP Implementation

There has been no priority attached to any these "Intents". A balance of actions will be required if the RAP is address the ecosystem approach. Resource priorities will have to be set, but it is anticipated that some level of action will be selected for each Intent.

Within each Remedial Intent, there are a number of Remedial Actions. These are the broad actions which are expected to be necessary to accomplish the Intent. They are essentially equivalent to the recommendations made in reports which do not have an implementation orientation. As an example, for the Intent that reads "Reduce the Impacts of Dry Weather Sources", the Remedial Actions are:

- o Reduce Loads from Industrial Dry Weather Sources
- o Reduce Loads from Residential Dry Weather Sources
- o Reduce Loads from Agricultural Dry Weather Sources

Under each Remedial Action are a series of Component Actions. These represent a compendium of the programs which are available to achieve the Remedial Action. Extending the example above, there are three Component Actions which seek to "Reduce the Loads from Industrial Dry Weather Sources:

- o Trace and Disconnect Industrial Cross Connections
- o Improve Spills Response and Prevention
- o Improve Industrial Best Management Practices

The majority of the detailed information provided is contained under the Component Actions. Each contains an introduction, description of existing programs, potential program improvements (with costs where available), potential benefits, and discussions of dependent projects, monitoring and reporting requirements, implementation considerations, and potential delays.

### Comments

The options provided represent a complex set of actions which will be difficult for those who have not been actively involved in environmental issues in Toronto to integrate into a holistic view. Part of the purpose of the paper is to provide information to those who have not been dealing with the issues on a day-to-day basis. There will be many methods of assessing the contents of the document and reaching conclusions, however as a first effort, the reader may wish to consider the following questions:

- o Do you agree with the Remedial Intent?
- o Do you agree that the Remedial Actions are necessary to achieve the Intent?
- o What is the relative importance of each Component Action?
- o Are there other actions which need to be considered?

Ultimately, resources will need to be allocated and the overall selection of options assessed to ensure that the RAP goals, as established by the Public Advisory Committee, will be achieved. The reader is urged to become involved in the option selection process through the Public Advisory Committee and its Sectors. This is seen as the best means of achieving consensus on differing points of view.

Individual comments and submissions may be provided, in writing to:

Doug Andrews  
Metro Toronto RAP Coordinator  
Ministry of the Environment  
Central Region  
7 Overlea Boulevard  
Toronto, Ontario  
M4H 1A8

Information on involvement in the Public Advisory Committee process can be received by contacting:

PAC Chair  
c/o Jim Martin, Facilitator  
112 Newbridge Crescent  
Brampton, Ontario  
L6S 4B3  
tel: 453-7422

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### REMEDIAL INTENT #1

#### IMPLEMENT SPECIFIC PLANS TO CORRECT LOCALIZED USE IMPAIRMENTS

##### Summary of the Problem

The sources of contaminants affecting the Metro Toronto waterfront are diverse and far ranging. They include discharges from water pollution control plants and sewers, deposits of contaminated sediments, lakefilling activities, atmospheric deposition and discharges to Lake Ontario from "remote" sources such as the Niagara River.

A very broad, ecosystem based plan will be required if significant progress is to be made in restoring all of our rivers and the lake. The magnitude of the task and the resources that will be required suggest that the plan will have to be long-term in nature. Because many of the impairments result from the discharge of urban stormwater, it is anticipated that a great deal of effort will have to be expended before measurable progress towards remediation is made.

Discussions with the public in various forums have suggested the need for measurable progress in the short-term, while continuing to work towards long-term solutions. Pollution control successes are necessary to demonstrate that remedial efforts can make a difference. This is consistent with the philosophy which has been employed since 1984 through the WWQIP program (see Component Action 1.3.1). Under this program, specific problems have been identified, the causes and possible solutions have been studied, and remedial measures have been implemented or slated for implementation. These types of projects are usually aimed at improving water quality in specific areas where a use is impaired. In some cases the contamination is simply transferred to a less sensitive area from a use perspective. While criticism may sometimes be levelled at this type of solution because of this, the programs and projects are aimed at rapid solution of problems and are supportable, when considered within the context of the RAP where the majority of actions address the larger ecosystem.

This Remedial Intent of the Metro Toronto RAP breaks out projects or programs which may be expected to have a measurable effect in the short-term. The component actions described typically involve specific projects aimed at remediation of use impairments or problems within a geographically limited area. The projects typically attempt to reduce impacts of various sources. They may require construction of physical works and/or localized enhancements to the activities being conducted under the more generic programs. The key to their inclusion is that the impairment is caused by a limited number of sources, rather than, for instance, an entire watershed full of storm sewer outfalls.

The emphasis under this Remedial Intent is to allow special consideration of projects or programs which can produce rapid improvements in the short term. It is believed that a

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string of such successes would assist RAP implementation by building momentum and enthusiasm which will help generate the support necessary to maintain longer term efforts aimed at improving the larger ecosystem problems facing the RAP area.

Remedial programs relating to lakefilling are included under this intent. While these programs are not truly oriented towards rapid remediation, they are included in this section because of the localized nature of their impact.

### REMEDIAL ACTION # 1.1: Continue Implementation of Projects Under Way

All of Metro's beaches have been posted in recent years, advising against bathing, because of high levels of fecal coliform (FC) bacteria. The number of beach postings increases as summer progresses due to increased bacteria survival in sediments in the warmer water, constant dry weather loadings and higher rainfall frequency. The sources of pollution which cause beach closings are not new and have likely been of similar magnitude for decades. The increased number of beach postings is more a matter of improved sampling and advisory methods, rather than a worsening of pollution sources. Despite this, there is no question that the desire to make our beaches swimmable has been a major driving force in terms of pollution abatement activities over the last decade.

Discharge from storm sewers and combined sewer overflows are the principal causes of bacterial contamination. These discharges affect the beaches directly through discharge to the lake and indirectly through discharge to the rivers. The importance of lake versus riverine discharge varies with beach location. The eastern beaches are affected primarily by direct sewer discharges to the lake. The western beaches are affected by both direct lake discharges and the Humber River. The central area beaches are effected by local runoff and discharge from the Don River.

Efforts to alleviate the beach closure problem resulted in the construction of the Humber River diversion jetty in 1984. This project, which was intended to reduce the impacts of the Humber River, has been only partially successful. Recent studies indicate that discharge from the Humber River following a rain continue to influence the western beaches FC densities. Studies are continuing to search for short term solutions, as an interim measure, while more comprehensive stormwater controls are instituted on the Humber River.

Based on the results of a study which investigated a number of pollution abatement alternatives for the Eastern Beaches, the City of Toronto has proposed construction of two detention tanks, one at Woodbine Beach (2,250 m<sup>3</sup>) and the other at Scarborough Beach (16,000m<sup>3</sup>). The tanks are expected to reduce discharges from six storm sewers and two CSOs to two or three times per year, thereby substantially reducing the number of days the Eastern Beaches are placarded during the summer. This project is ongoing and is discussed as Component Action # 1.1.1

To remedy the placarding of the Centre Island Beach, the City of Toronto plans to construct a staged diffuser east of the breakwater (Gore & Storrie, 1987d). This device

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will generate a high velocity jet of water which acts as a curtain, deflecting contaminated Eastern Gap water away from the Centre Island Beach area during runoff events. During dry weather periods, the staged diffuser could be operated in reverse to provide circulation water inside the breakwater as required. This project remains under consideration, and is presented as Component Action # 1.1.2.

### COMPONENT ACTION # 1.1.1: Eastern Beaches Detention Facilities

Beach water quality [fecal coliform (FC) counts] is for many days during the swimming season in violation of Provincial Water Quality Objectives, resulting in beach postings. Studies have shown that elimination of Combined Sewer Overflow (CSO) alone would not significantly improve the situation but the elimination of the direct impact of storm sewer discharge is required as well. Two basic options were evaluated: extension of sewer outlets to provide dispersion, and detention of CSO and storm runoff with subsequent treatment at Metro's Main Sewage Treatment Plant. Extensive monitoring and analysis identified the need for sewer extension in excess of 300 m to be effective, i.e. beyond local eddies. Based on a cost comparison and the fact that detention provides an additional benefit by also reducing loads of other pollutants to Lake Ontario, the detention alternative was selected. Four alternative methods of providing detention were investigated resulting in the proposal of two tanks to be constructed in two phases; the first one (2 250 m<sup>2</sup>) at the foot of Kenilworth Avenue, intercepting 5 outlets and the second one (16 000 m<sup>3</sup>) at the foot of Glen Manor Drive and MacLean Avenue, intercepting three major outlets.

#### Existing Programs

The Phase 1 construction consists of three components: the detention tank (2 250 m<sup>3</sup>) itself, a header system to intercept 4 storm sewer outlets between Woodbine Avenue and Lee Avenue and one CSO outlet at Kenilworth Avenue, and a force main extending from the tank 400 m into the lake. This main is only to be used on those few occasions when the Main STP cannot handle the discharge from the tank.

Tender prices for this phase have been received in the order of \$4.375 million. Construction commencement is scheduled for September 5, 1989, and completion for May 31, 1990.

#### Potential Program Improvements

Although a significant improvement of beach water quality is expected particularly at Woodbine Beach, the construction of Phase 2, consisting of a tank (16 000 m<sup>3</sup>) and a force main extending 400 m into the lake, will provide further improvement of beach water quality. No header system is required due to the size of the tank allowing the direct discharge from the 2 intercepted storm sewers and one CSO outlet. The estimated cost of Phase 2 is \$ 10 million, with construction expected to commence in 1992 if there are no delays.

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### Potential Program Benefits

The elimination of direct discharges from the sewer system into the near-shore area will provide physical, chemical and bacteriological improvement of beach water quality. By eliminating the direct load to bottom sediments resuspension should be reduced, if not eliminated, in the long run as well.

It is expected that the number of days on which the Woodbine Beach is posted will be reduced from an average of 25 days to about 8 to 9 days per swimming season.

### Dependent Projects

In order to provide additional improvement at Woodbine Beach and an equivalent improvement for the entire waterfront of the Eastern Beaches, the construction of Phase 2 is required. To utilize the full potential of Phase 2, sufficient capacity at the Main STP is required to allow for the entire contents of tank 2 to be discharged to the Main STP in the majority of events. A study is under way to examine the Main STP and the Don Trunk Sewer System, in terms of the long term capacity needs resulting from this project, other CSO projects, potential abandonment of the North Toronto STP, and continued development demands.

### Monitoring Requirements

In order to assess the effectiveness of Phase 1, monitoring of quantity and quality of inflow to and overflow from the tank, outflow volume from the tank, and beach water quality is required. Close monitoring of the lake level is required to prevent lake water from flowing into the tank. A requirement by the MOE is the monitoring of possible odour generation.

### Reporting

Monitoring reports are to be submitted to MOE annually.

### Implementation

Two seasons of monitoring of Phase 1 are proposed prior to construction of Phase 2. Implementation of Phase 2 would consequently fall into 1992/93.

### Potential Delays

Extended Environmental Assessment for Phase 2.

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### Summary Information for Implementation

Component Action:	Eastern Beaches Tanks
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Main STP Improvements
Implementation Responsibility:	City of Toronto
Funding Responsibility:	Toronto/Province
Additional Costs Range:	Phase 1 \$ 4.375 million (1989-90) Phase 2 \$ 10.0 million (1992-93)
Monitoring Requirements	yes/quantity, bacteria, odour
Reporting Requirements:	annual
Timeframe:	1989 - 1993
Potential for Delay	Phase 1 - under way Phase 2 - medium
Potential Reasons for Delay	Environmental Assessment Main STP Capacity

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### Reference Documents

#### A) Council Reports:

- 1) The Beaches and the City of Toronto's Responsibility  
- August 9, 1983
- 2) The Beaches and the City of Toronto's Responsibility  
- March 22, 1984
- 3) The Beaches and the City of Toronto's Responsibility  
- May 8, 1985
- 4) The Beaches and the City of Toronto's Responsibility  
- April 22, 1986
- 5) The Beaches and the City of Toronto's Responsibility  
- April 6, 1987
- 6) The Beaches and the City of Toronto's Responsibility  
- November 23, 1987
- 7) The Beaches and the City of Toronto's Responsibility  
- January 25, 1989

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- 8) Detention Tank Facilities - Eastern Beaches  
- April 3, 1989
- B) Consultants Reports:
  - 1) Eastern Beaches Study 1984
  - 2) Eastern Beaches Study 1985
  - 3) Eastern Beaches Study 1986
  - 4) Eastern Beaches Stormwater and Combined Sewer  
Overflow Detention Facilities, April 1987

### COMPONENT ACTION # 1.1.2: Centre Island Staged Diffuser

High fecal coliform (FC) counts have been found in the beach area located on the south shore of the island resulting in beach postings. It has been determined through studies that the principal source of the contamination is water being discharged from the Eastern Gap. Water leaving the Eastern Gap tends to move in a westerly direction across the beach area. During run-off (storm) events in the Don Valley Watershed, the water from the Eastern Gap contains elevated FC levels. As this water containing high FC levels traverses the beach area, the beach water quality is adversely affected.

The principal source of water from the Eastern Gap is the Don River. As indicated under Component Action # 4.2.2, it has been established that substantial reductions in both CSO and storm sewer loadings for bacteria will be necessary if the Don River quality after a rainfall is not to have an affect on the Centre Island beaches. The implementation of controls to limit bacteria loads was the most expensive level of improvement considered in the recently completed Don River strategy report. It was estimated that full implementation might involve up to \$ 900 million over a period of up to 50 years.

As an interim measure to protect the Centre Island beaches until the Don River is restored, the City of Toronto has proposed the construction of a staged diffuser facility. A staged diffuser consists of an underwater pipe with a number of small ports through which lake water is pumped at a high velocity.

The diffuser would create a plume moving outward from the shore, and deflect the contaminated waters from the Eastern Gap away from the beach area. It was also proposed that provision be made to operate the diffuser in reverse, encouraging turnover for the water behind the breakwater located parallel to the beach. This operation would be provided during extended dry periods of the swimming season only.

### Existing Programs

It is proposed to construct the "staged diffuser" in two phases. Phase 1 would consist of an underground pumping station, a lake water intake pipe, and an outflow pipe at the end of which a staged diffuser would be placed in a water depth of approximately 2m. The diffuser would be operated during and 24 hours after rain events within the Don Valley

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Watershed. The estimated cost for Phase 1 is \$ 977,500. Phase 2, which would allow for use of the device for improved circulation would cost an additional \$ 593,000.

Commencement of construction depends on approval under the Environmental Assessment Act. The earliest implementation would therefore be in 1990-91. This project is currently on hold because the Province has refused funding due its "band-aid" nature. Input is being sought through this document to determine whether this type of project is desirable, within the context of the full RAP.

### Potential Program Improvements

If the diversion of polluted water from the Eastern Gap does not provide sufficient water quality improvement at the Island beach a second phase is proposed to provide, during extended dry weather periods, for the exchange of the polluted water behind the breakwater protecting the beach.

Actions to clean up the Don River may eventually eliminate the need to deflect water from the Eastern Gap away from the Centre Island beaches. Continued use of the diffuser to provide turnover will provide an ongoing benefit, however.

### Potential Program Benefits

It is expected that the deflection of polluted water and consequently the prevention of it impinging on the beach area located behind the protecting breakwater will reduce the number of days on which beach water quality is in violation of Provincial Water Quality Objectives.

It is noted that the staged diffuser does not eliminate the pollution source but is intended to serve as an interim solution until other remedial measures in the Don Valley Watershed have effectively improved water quality in the Don River.

### Dependent Projects

If the effect of Phase 1 (diffuser) is insufficient it is proposed to proceed with Phase 2 - the exchange/dilution of the beach water behind the breakwater. No other projects are affected by decisions relating to the staged diffuser.

### Monitoring Requirements

After completion of Phase 1 daily beach water monitoring is required to assess the effectiveness of the staged diffuser and the need of Phase 2.

### Reporting

The City of Toronto will maintain records of beach water monitoring data.

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### Implementation

Public consultation under a Class EA is proceeding. Implementation will depend on the results of this process and willingness of the parties to fund the project. Initial reaction in among some public groups has been negative because the project does not eliminate pollution but rather diverts it. While this is recognized by the City, the fact that the project is targeted against bacteria which die off in the environment rather than accumulating and the high cost of the Don River clean-up argue in favour of this short term solution.

### Potential Delays

Public objection and extended approval processes.

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### Summary Information for Implementation

Component Action:	Staged Diffuser
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Don River Water Quality Strategy
Implementation Responsibility:	City of Toronto
Funding Responsibility:	Toronto/Province
Additional Costs Range:	Phase 1 \$ 0.977 million (1990-91) Phase 2 \$ 0.593 million (1992-93)
Monitoring Requirements	yes/beach quality (bacteria)
Reporting Requirements:	annual
Timeframe:	1990 - 1993
Potential for Delay	Phase 1 - high Phase 2 - medium
Potential Reasons for Delay	Environmental Assessment

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### Reference Documents

Two reports have been prepared for the City of Toronto:

"Centre Island Beach Study 1985", by Gore and Storrie Ltd. (1986)

"Centre Island Beach Study 1986", by Gore and Storrie Ltd. (1987)

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### REMEDIAL ACTION # 1.2:      Initiate Implementation of Projects Which Have Been Previously Recommended

Investigative and remedial actions aimed at the control of urban pollution sources, have been ongoing in Metro, under the TAWMS program since the early 1980's. Cooperative action by municipalities and MOE have led to broad program improvements (detailed under the various Component Actions) and specific projects such as the Eastern Beaches Tanks (Component Action # 1.1.1). There have been a number of recommendations made however, in reports produced by TAWMS and others, for which there has been no readily observable action. Major recommendations which fall into this category include pilot stormwater ponds and CSO elimination. These are discussed in detail under Component Actions # 4.3.2 and 2.2.1 respectively.

Public comment has focused repeatedly on the desire to implement actions which have been recommended in previous studies. It is instructive therefore, to examine one geographical area in particular, the western beaches, where the relatively little in the way of concrete action has occurred. The following section documents the history and the continuing efforts to remediate this area of the waterfront. Additional information related to the status of programs on the Humber River, which exerts a major influence on the western beaches is provided in Component Action # 4.2.1.

### COMPONENT ACTION # 1.2.1:      Western Beaches Remediation

The western beaches for the purposes of this discussion paper are defined as the waterfront west of Ontario Place to the mouth of the Humber River. The western beaches have suffered from poor water quality which has resulted in repeated beach closures through late summer. In terms of the number of days of beach closures, it is more severely affected than either the island beaches or the eastern beaches. Water quality is adversely impacted by the Humber River, direct stormwater runoff, combined sewer overflows and storm sewer outfalls. Deposition of fecal contaminants from birds, and land animals, and breakwater restrictions of near-shore water circulation aggravate the problems.

The Humber River contributes high bacterial loadings, particularly during and after storm events, but also during dry weather conditions, to the western beaches. The full, direct impact of the Humber River was somewhat reduced in 1984 through the creation of a diversion jetty to act as a deflector and direct contaminated river water to the lake, avoiding contamination behind the breakwall. This action has not been totally successful.

During periods of wet weather significant amounts of bacteria are discharged from combined sewer overflows. In addition, storm sewers discharge directly to the waterfront and Lake Ontario during both wet and dry weather. The major contributors to dry weather discharge are inflow/infiltration (i/i) and illegal cross connections. The combination of these discharges, are the major contributing factors to the beach closures and the loss of recreational opportunities. Typically the western beaches are placarded through late summer for about two thirds of the available days.

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### Existing Programs

In 1986 the Humber River Water Quality Management plan was completed by the TAWMS steering committee. One of the recommendations of the Plan was that tanks be constructed to retain CSO on the Humber River, with retained flow being diverted to the Humber STP for treatment. Concerns were expressed by Metro that there was insufficient capacity in the sewer trunks and at the plant itself to allow this.

In response to these concerns and increasing desires to seek solutions for the beach closures occurring on along the western waterfront, Metro and the City of Toronto initiated the "Trunk Sewer System Review and Water Quality Management Plan". The objectives of this study were to examine trunk sewer capacities in relation to CSO retention and future development demands, and to investigate control strategies for protection of the western beaches. The study was completed in 1987. In addition to identifying the expansion needs for the trunk sewers and the Humber treatment plant the study indicated that:

Reduction of CSO to a once per year basis along the western beaches would cost an estimated \$ 23.5 million.

Similar reductions in stormwater discharge for the same area would cost an estimated \$ 38 million.

While pollution from these sources would be reduced, no reduction in the number of beach closures would be anticipated because of the impacts of the Humber River.

The report recommended that any actions of this magnitude only be undertaken as part of a comprehensive control strategy for all of Metro. Several recommendations were made relating to water quality however, including:

Construction of the Simcoe street inter-connecting sewer. One of the reasons for this was to prevent an increase in CSO as new development and redevelopment increase flows.

Installation of remotely controlled flow control equipment in the Carlaw interconnecting sewer, to prevent backflow into the mid-Toronto interceptor during storm conditions.

Introduction of "real time control" for the mid-Toronto Intercepting sewer for the containment and treatment of combined sewer overflows.

Investigation of the manner and cost of treating CSO retained through "real time control".

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The 1989 Metro capital works program contained allocations for the first two recommendations at costs of approximately \$ 7.3 and \$ 1.2 million dollars. The last recommendation was undertaken as part of the Don Trunk and Main Plant Capacities Study, which has recently been completed. The third recommendation was deferred pending completion of this study.

Metro has continued remedial measures, common throughout Metro, in areas tributary to the western beaches. On going remedial actions related to water quality in the Western Beaches being presently investigated are as follows:

- Completion of a monitoring program of storm sewer outfalls along the Western Beaches for fecal coliform contamination.

- Repairs and extension of the W-8 damaged outfall has been completed by Metro's transportation department and the City of Toronto Public Works Department. The effluent from the pipe is discharging beyond the breakwater and near shore water quality should improve as a result.

- Implementation of the new Sewer Use Control By-law.

- Implementation of programs to reduce bird and animal contamination  
sewer separation to reduce CSO

In addition the City of Toronto has continued the development of computer models which may be used to evaluate strategies for pollution control along the western beaches.

### Potential Improvements

In general the western beaches area is not amenable to rapid remediation through localized improvements because the number of sources affecting the beaches is not limited, but rather includes much of the lower Humber River. Development of a comprehensive CSO policy, with requisite expansion of treatment facilities (see Component Action # 2.2.1) is a necessary step, but in addition control of stormwater runoff will be required, before a long term solution is realized.

A number of potential improvements are currently being investigated or are moving towards implementation. These include:

- Possible disinfection of storm water at point discharge locations or facilities to store and/or treat storm water discharges. A storm water pond at Emery Creek is being considered (see Component Action # 4.3.2)

- Continued implementation of sewer separation and detention projects to reduce the quantities of stormwater entering combined sewer systems (See Component Action # 2.2.1)

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Expansion of capacity of the Humber Treatment Plant to accommodate peak loads and CSO (see Component Action # 2.1.2)

Continued detection and correction of illegal cross connections (see Component Action # 2.2.2).

Investigation of the construction of the Black Creek Trunk Relief Sewer with sufficient capacity to provide for the virtual elimination of CSO on the Black Creek sewershed, in addition to the capacity needed for planned development (study currently under way).

In addition to these actions, Metro Works has been asked to report on the feasibility, cost and timeframe required for sealing and sectioning the breakwall at the western beaches to provide discrete units which could be filled with potable water in order to provide swimming and recreational opportunities. Preliminary conceptual estimates for a project of this type were completed in 1983 and updated in 1987. Two options were considered, each involving sealing of a section of the breakwall in the vicinity of Sunnyside Beach and treating the lake water using filtration and disinfection facilities. The estimated costs for the options ranged from \$ 30 - 75 million (1987 dollars) depending on the type of treatment used.

This potential project is similar to the Staged Diffuser (Component Action # 1.1.2) in that it would not reduce pollution, but may be considered within the context of a RAP strategy which contains commitments to source control in addition to such measures. The high cost of the option would likely have significant implications regarding resource allocation however, and therefore could effect the implementation of other projects with a source reduction orientation. It is anticipated that there will be opposition to this project from many quarters, including the RAP team.

### Potential Benefits

The benefits of the actions listed above are described under the specific Component Actions. In general it should be recognized that during the early years of implementation, the benefits will be largely associated with reduction in the amounts of contaminants entering the lake through the western waterfront area. Tangible, use-oriented benefits, such as reduced beach closures are not expected until substantial construction has taken place.

### Dependent Projects

Western beach contamination remediation depends on the commitment of a major increase of financial resources to reduce/remove the CSOs which are the major contributing cause of degraded beach water quality. CSO reduction, according to current plans, will require expansion of sewage treatment plants and trunk sewer systems.

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### Monitoring

The City of Toronto has conducted dry weather sampling. Metro has completed wet weather sampling for the western beaches. There has been some problem with accuracy of specific outfall monitoring in the area of the Western beaches, particularly near the CNE, as outlets are submerged and exact pipe locations can not be ascertained. The possibility of going "up-pipe " has been discussed by Metro, but then the possibility of actually getting fecal counts from illegal cross connections, rather than CSO, is significant.

A specific monitoring strategy will be defined as part of the RAP development process. Monitoring will have to address both end-of-pipe (operational) monitoring and lake (ambient) monitoring.

Metro has increased its monitoring staff for next year by 4 additional positions for a total of 6, or 3-two person crews to be assigned to the waterfront, and Don and Humber rivers.

### Reporting

Sampling data should be made available to concerned municipalities. City of Etobicoke and City of Toronto should be advised of where high discharges of fecal coliform bacteria exists. There should be provision for annual update and exchange of sampling data between affected municipalities. Overall reporting on progress will be provided in the annual RAP report.

### Potential Delays

The potential for delay of programs necessary for western beaches remediation is considered high because of the magnitude of the resources required for program implementation.

### **Funding**

The relative cost effectiveness of many of these projects would not bear scrutiny under a cost benefit analyses. Extensive public input and support will have to be generated in order to undertake the programs, especially where tangible benefits may not be expected until well into the future.

### **STP Capacity**

The construction of CSO storage facilities assumes the plant(s) receiving the stored waste have sufficient capacity available to treat it. Plant expansions to deal with treatment of CSO, must be undertaken first, before installation of CSO retention facilities. Treatment plant expansion will require environmental assessment.

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### **Trunk Capacity**

The design of the CSO facility would have to include an analyses of the available capacity in the trunk sewers between the storage site and the treatment plant. The rehabilitation/expansion to the existing infrastructure requires environmental assessment.

### **Environmental Assessment**

A municipal class environmental assessment will be required on most potential remedial measures requiring construction of capital works, since most projects are dependent on trunk sewer or plant capacity.

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### **Summary Information for Implementation**

Component Action:	Western Beaches Remediation
Priority of Remedial Intent:	
Priority of Remedial Action:	
Related Programs/Projects:	STP expansion CSO Policy Trunk Sewer Projects
Implementation Responsibility:	Metro
Funding Responsibility:	Metro/Province
Additional Costs Range:	see specific Component Actions
Timeframe:	Ongoing
Potential for delay:	high
Potential Reasons for Delay:	Funding STP Capacity Trunk Capacity Environmental Assessments

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### Reference Documents

1. Metropolitan Toronto Policy to Manage Sewage Collection and Treatment in Wet Weather
2. Metro Toronto presently funds both York and East York
3. Metro Toronto Department of Works Water Pollution Control Division Budget

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4. Metro Toronto Remedial Action Plan - Environmental Conditions and Problem Definition, September 1988.
5. Trunk Sewer System Review and Water Quality Management Plan

### REMEDIAL ACTION # 1.3

#### Continue Special Provincial Funding Programs to Encourage Implementation of Water Quality Improvement Projects

Over the last decade a number of enhanced subsidy programs have been established by the Province to encourage municipal efforts which bear on water quality protection. The programs were established in order to accelerate actions involving immediate pollution abatement or to encourage studies aimed at defining long-term maintenance needs for municipal systems, thereby preventing breakdown or loss of efficiency which could lead to environmental degradation. The two programs having the greatest impacts in the RAP area are the Waterfront Water Quality Improvement Program (WWQIP) and the Infrastructure Rehabilitation Program (LifeLines).

Early in the work conducted by the TAWMS Steering Committee, the need for remedial actions became apparent. As an interim measure, pending completion of the watershed plans, the Waterfront Water Quality Improvement Program (WWQIP) was established in 1984. By the end of 1988, approximately \$50 million was committed or spent by the MOE, Metropolitan Toronto and its area municipalities on:

sewer separation, CSO and storm relief works yielding cumulative benefits over both short and long-terms;

physical work on the watercourses, waterfront or sewer systems yielding immediate short-term benefits;

studies and/or monitoring and investigations to provide information on which effective subsequent actions could be based.

Numerous studies and remedial actions have been undertaken under WWQIP which have begun the process of restoring the beneficial uses along the Metro Toronto waterfront and its watercourses.

In 1986, Environment Ontario announced its LifeLines Programme. The objectives of this program are to:

develop Pollution Control Plans for municipalities to determine effective means of controlling pollution;

appraise municipal needs in rehabilitating decaying and inefficient sanitary sewers and watermains by carrying out Needs Studies;

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provide capital work funds for water/sewer infrastructure repairs, combined sewer overflow control and stormwater treatment.

Under LifeLines, MOE will provide municipalities with financial assistance for Needs studies, Pollution Control Plans and capital works projects. Depending on a municipalities need, these grants will cover no less than one third of the rehabilitation costs involved and no less than half the study costs.

It is felt that the remedial efforts on-going under the TAWMS, WWQIP and LifeLines provide a good basis for the actions necessary to reduce the impacts of sewer discharges to the Metro Toronto waterfront. Continuing efforts will be needed, and because of the size of the systems involved, priorities will need to be set. The Metro Toronto RAP, through involvement with municipalities and the public, will establish the needed priorities and time frames for implementation.

### COMPONENT ACTION # 1.3.1: MOE/Metropolitan Toronto Waterfront Water Quality Improvement Program

The Waterfront Water Quality Improvement Program (WWQIP) is an on-going program initiated in 1984 to assist Metro Toronto and its area municipalities with studies and remedial works to improve water quality in its area watercourses and waterfront. Projects eligible for funding under the program include:

- abatement work to detect and remedy storm sewer drainage systems identified as "priority" by the Toronto Area Watershed Management Strategy;
- studies and/or monitoring and investigations to provide further information to provide assistance in pre-engineering and engineering design work;
- capital works projects such as sewer separation, CSO, storm relief works and watercourse and waterfront improvements.

The Ministry's Water Resources Branch provides funds to Metropolitan Toronto for studies, investigations and some miscellaneous improvement and abatement works. Metro Toronto makes disbursements to the six area municipalities.

Major capital works (ie. sewer separation) are funded by the MOE's Project Engineering Branch. These disbursements are made directly to Metro Toronto and the local municipalities.

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### **Existing Programs**

#### **Beach and Sewer System Studies**

Studies of the area beaches and sewer systems have found that urban stormwater runoff and combined sewer overflows are the primary sources of fecal coliform pollution of the Metro waterfront. These studies have produced computer models of existing conditions including models of the sewer system and waterfront current patterns and fecal coliform bacteria densities. The urban runoff models developed during the studies can be used to estimate loadings and assist in the evaluation of proposed remedial measures. The lake current pattern and fecal coliform density models may be used to examine the effects of remedial measures affecting the physical lay out of the waterfront.

Unique solutions to the problems of storm water runoff have been investigated with funds from the WWQIP including a staged diffuser and storm water storage tanks (Component Action # 1.1.1 and 1.1.2).

The staged diffuser was investigated to demonstrate its effectiveness in deflecting contaminated runoff from the Eastern Gap away from Centre Island Beach on south side of Toronto Islands. Final design was completed after a modelling study showed the diffuser's effect on water currents in the area.

The Program has also funded a design study for operating improvements to the City of Toronto's sewer outlets in the Eastern Beaches. The preferred option involves the construction of two underground storage tanks. Runoff will be collected and detained for later treatment at the Main Sewage Treatment Plant prior to discharge into Lake Ontario. Construction of the first tank is under way.

#### **Priority Storm Sewer Abatement Program**

During the Toronto Area Watershed Management Strategy (TAWMS, 1982-1986) storm sewer and combined sewer outfalls were monitored and ranked for abatement. It was determined that any storm or combined sewer outfall having an average dry weather loading rate equal to or greater than 10,000 counts per second of fecal coliforms and a flow rate equal to or greater than 0.1 litres per second was a priority outfall and was placed on an abatement list. At least four consecutive samples and flows collected over a two month period was required to place an outfall on this priority list. An outfall may be removed from the list if pollutant sources are found and appropriate remedial measures are carried out. A priority outfall is placed in a Holding File when no potential exists for cross connections due to the absence of necessary structures and no remedial works are possible.

As of May, 1988, the following progress has been made in removing the sources of sanitary contamination from the storm sewer system:

East York:           twenty priority outfalls listed.

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Etobicoke: fifteen priority outfalls removed from list,  
thirty-four priority outfalls still listed,  
four outfalls in the holding file.

North York: seventy-nine priority outfalls listed,  
one outfall in the holding file.

Scarborough: thirty-seven priority outfalls listed.

Toronto: twenty-one priority outfalls removed from list,  
twenty-one priority outfalls still listed,  
two outfalls in the holding file.

York: two priority outfalls removed from list,  
twenty priority outfalls still listed.

The following table shows that over \$2.3 million has been provided for this aspect of the program in the 1984-1989 period.

### FUNDS PROVIDED FOR PRIORITY STORM SEWER ABATEMENT PROGRAM 1984-1989

East York	\$100,000
Etobicoke	\$300,800
Metro Toronto	\$140,000
North York	\$523,000
Scarborough	\$840,000
Toronto	\$65,000
York	\$412,000
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TOTAL	\$2,380,800

### Capital Works Projects

A considerable amount of capital work funds have been utilized for sewer separation. Sewer separation reduces the amount of flow in a combined sewer during rain events by collecting stormwater in a new separate storm sewer. As a consequence of reducing stormwater the sewage treatment plant is better able to treat the flow and the potential for combined sewer overflows and plant by-passes are reduced. As the following table shows, approximately \$32 million has been committed for sewer separation projects under the WWQIP between 1984 and 1988.

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	WWQIP SEWER SEPARATION PROJECTS				
	East York	Scarborough	Toronto	York	Total
1984	2,653,994		2,220,091	3,765,046	8,639,131
1985	5,016,473		2,694,610	2,536,650	10,247,733
1986*	4,020,000		1,840,000	1,385,000	7,245,000
1987*	3,641,000			1,107,000	4,748,000
1988*		590,000		1,000,000	1,590,000
Subtotal	15,331,467	590,000	6,754,701	9,793,696	32,469,864

\* estimated expenditures

Another method of reducing inflows to combined sewers is to provide inlet controls on catchbasins. Inlet control measures detain the stormwater component of combined sewage in tanks or on the road so that the capacity of both the sewer and the STP is not exceeded. Measures include catchbasin flow restrictors, catchbasin sealing and additions of detention tanks. Restrictors and/or detention tanks placed in catchbasins limit the rate of inflow to the existing sewer system. Other catchbasins are sealed wherever positive drainage can be maintained. As of 1988, the WWQIP has included over \$3 million for these type of works.

Capital works funded by the program have also included beach clean-ups and algae removal, reconstruction of the Humber River diversion, and physical shoreline improvements.

Potential Program Improvements

**A. Expand Scope of Program**

Expansion of the scope of the program to include all of the municipalities in (or the area within) the Toronto RAP's watershed would encourage a similar level of effort towards pollution abatement. The municipalities within the watershed not included in the current agreement are:

Regional Municipality of Durham:  
Town of Pickering

Regional Municipality of Peel:  
City of Brampton  
City of Mississauga  
Town of Caledon

Regional Municipality of York:  
Town of Markham  
Town of Richmond Hill

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Town of Vaughan  
Town of Whitchurch-Stouffville  
Township of King.

No costs for this option are provided because they will be dependent upon the decisions made during the RAP option selection process. The costs provided under other Component Actions in this document indicate whether WWQIP funding is available or proposed. Expansion of the WWQIP program to the Regions outside Metro while encouraging environmental programs outside of Metro, may reduce the Provincial resources available for projects within Metro.

### Potential Program Benefits

All studies, abatement programs and capital works funded under the WWQIP have positive contribution for the improvement of water quality in the RAP area's water courses and waterfront. The Priority Storm Sewer Abatement Program has alerted municipalities to dry weather discharge problems. By working "up sewer" in these identified priority areas, illegal or accidental sanitary cross connections can be corrected. This by itself will help improve water quality during non-rain periods.

Capital Works Projects such as sewer separation and inlet control have reduced the frequency of basement flooding and the volume of combined sewer overflow reaching the beaches. Work is presently ongoing to reduce direct stormwater and combined sewer discharges to the Eastern Beaches by storage and treatment. Further projects for CSO abatement and stormwater are envisioned and will provide a significant benefit to water quality improvement.

Studies related to beaches and the sewer systems will continue to provide necessary information for pre-engineering and engineering designs. However, if these studies are not followed up by remedial works, no water quality benefit will be derived.

### Dependent Projects

Ministry of Transportation programs related to funding of storm sewer construction may influence timing of sewer separation works.

Municipal sewer construction and maintenance schedules will effect the outfall monitoring, cross connection identification, sewer separation, and inlet control programs.

### Monitoring Requirements

Requirements vary among the individual projects that have been approved for funding. The types of monitoring that have been required include flow monitoring, water sample collection and water quality analysis, rainfall, wind, and current recording.

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### Reporting

It is expected that the local municipalities have records of data collected, problems identified, work initiated, completed, and pending for all programs under the WWQIP. Some information is supplied to the MOE, however, records are not complete.

In the past, participating municipalities have consistently supplied the Ministry with consultant's reports regarding studies and capital works projects. Information collected for the Priority Storm Sewer Abatement Program has rarely been submitted and usually only on request. Reporting in this area could be improved if a generic information form could be submitted on an annual basis. Work is under way in this area.

### Implementation

Implementation of a WWQIP with an expanded scope will require Ministerial approval. Proponents must put forward their projects for consideration six months prior to the beginning of the fiscal year in which it is to be considered. Funding of projects in any particular year are subject to the availability of resources.

In recent years the program approval of selected projects, from the MOE, has been provided late into the fiscal year of Metro Toronto and its area municipalities. To improve this situation, discussions for new projects were initiated a number of months earlier and documentation guidelines were produced to provide adequate information to MOE for project evaluation and funding approval. Quicker program approval is therefore envisioned for 1990.

### Potential Delays

As projects for inclusion in the WWQIP are currently initiated and administrated by the municipalities, local priorities and staff complements will determine municipal participation.

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### Summary Information for Implementation

Component Action:	Waterfront Water Quality Improvement Program
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Municipal and Ontario Ministry of Transport programs
Implementation Responsibility:	Municipalities
Funding Responsibility:	MOE/Municipalities
Additional Costs Range:	
Monitoring Requirements:	Project specific/RAP monitoring
Reporting Requirements:	Annual
Time frame:	Existing program
Potential for Delay:	High
Potential Reasons for Delay:	Funding Negotiations Dependent on Municipal staff direction and priority

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### Reference Documents

Eastern Beaches Study 1984  
Gore & Storrie Limited, 1985

Eastern Beaches Study 1985  
Gore & Storrie Limited, 1986

Eastern Beaches Study 1986  
Gore & Storrie Limited, 1987

Centre Island Beach Study 1985  
Gore & Storrie Limited, 1986

Centre Island Beaches Study 1986  
Gore & Storrie Limited, 1987

Centre Island Staged Diffuser Study  
Gore & Storrie Limited, 1987

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Western Beaches Study 1985  
Gore & Storrie Limited, 1986

Local Influences On the Water Quality of the Western Beaches,  
Toronto  
Kleinfeldt Consultants Ltd., 1986

Western Beaches Study 1986  
Gore & Storrie Limited, 1987

Western Beaches Study 1987  
Gore and Storrie Limited, 1988

Joint Pilot Study on Chlorination, Interim Report  
Ministry of the Environment

Study of Sediment Impact on Water Quality and Aquatic Life  
I.E.C. Beak Consultants Ltd., 1985

Considerations on Real Time Control of Wastewater Transport  
Systems with Special Reference to the Toronto Area  
Wolfgang Schilling and Paul Wisner, Department of Civil Eng., U. of Ottawa, 1985

Trunk Sewer System Review and Water Quality Management Plan  
Gore & Storrie Limited and MacLaren Engineering, 1987

Study of the Future of the North Toronto Treatment Plant  
Gore & Storrie Ltd., 1987

Review of Sewer Separation Impact and Evaluation of Alternative  
Strategies - East York  
Gore & Storrie Limited, 1987

City of Scarborough Pollution Control Strategy - Final Report  
Proctor & Redfern Ltd., 1987

The Highland Creek and Rouge River Pollution Study  
Gartner-Lee Limited, 1987

Humber Sanitary Trunk Sewer System and Treatment Plant Study  
UMA Engineering Ltd., 1988

Metropolitan Toronto Waterfront Water Quality Improvement Program Information System  
Ministry of the Environment, 1988  
(contains a list of all projects approved for funding to date, the reports produced including  
summaries and cost information)

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### COMPONENT ACTION # 1.3.2:

### Lifelines Programme

The Lifelines Programme was instituted in 1986 to assist municipalities with studies and remedial works on their water and sewage infrastructure. It is a province-wide program and the resource demands therefore extend beyond the Toronto RAP area.

Most municipalities within Metro Toronto, Peel, York and Durham Regions, having lands draining to the Metro Toronto Waterfront via tributary streams or directly to Lake Ontario, have projects ongoing under the Ministry of the Environment's Lifelines Programme. A municipality applies for a grant under the LifeLines Program and submits a completed questionnaire for the specific project.

Studies and works funded under the MOE Lifelines Program include:

Pollution Control Planning Studies

Needs Studies for both municipal water distribution and/or sewage collection systems

Rehabilitation of municipal Water Distribution and Sewage Collection Systems

The following section deals solely with projects related to the sewage collection systems within the Toronto RAP Area.

### Existing Programs

#### **Pollution Control Planning Studies:**

To assist in the development of a water pollution control plan for a defined urban or rural area, grant assistance is available. Such studies will outline the nature, cause, and extent of pollution problems, propose alternative remedial measures and recommend an implementation program. The level of grant assistance is based on municipal population with a minimum grant of 50% to a maximum of 85%.

The only Pollution Control Planning (PCP) study which is ongoing among municipalities within the Toronto RAP area is in the Region of Durham. This particular study addresses concerns outside of the RAP area and will not be described here. Much of the Toronto RAP area has received the equivalent to a PCP study as part of the Toronto Area Watershed Management Study (TAWMS) and this accounts for the lack of studies being conducted under Lifelines. The TAWMS program was initiated prior to the advent of Lifelines.

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### Needs Studies:

A Sewer Collection Needs Study provides an inventory of the existing sewage collection system, identification of the deficiencies within the system and a plan of action for a rehabilitation program. The data is normally entered into a computerized inventory system, called Sewer Inventory Management System or SIMS. This SIMS program was developed under the auspices of the Tri-Committee, O.G.R.A., M.E.A. and A.P.W.A. and received funding from MOE.

The following table summarizes the status of Needs Studies within the RAP area.

#### Needs Studies Under Way in the RAP Area

<u>Region</u>	<u>City</u>	<u>Total Cost</u>	<u>MOE Grant</u>	<u>Budgets (\$ 1000s)</u>			<u>Percent Remaining</u>
				<u>Prior Years</u>	<u>FY 89-90</u>	<u>FY 90-91</u>	
Metro	East York	500	250	45	45	45	46
	Etobicoke	188	94	31	57	6	0
	North York	2480	1241	629	368	179	5
	Scarborough	2108	1054	483	200	200	16
	York	799	400	36	69	69	57
York	Markham	1233	617	49	129	130	50
	Richmond Hill	356	178	9	40	40	50
	Vaughan	115	58	0	52	6	0
Peel	Brampton**	710	355	72	100	100	23
Total		8,489	4,247	1,354	1,060	775	25

\* After FY 90-91

\*\* Peel Region is conducting this study directly

In addition to the studies related to sewage systems, many of the RAP municipalities are conducting studies of their water distribution systems. The resources allocated to these studies have not been included because they will not result in significant improvement to the ambient environment.

### REHABILITATION PROJECTS:

Under the Lifelines Program the Ministry will fund up to 33% for eligible rehabilitation of sanitary sewers. The proposed rehabilitation works are usually identified as part of the Needs Studies undertaken by the municipality. Since the programme has only been under

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way since 1986, only a few municipalities within the RAP area have initiated rehabilitation projects to date. A municipality is required to request funding under the LifeLines Grant Program and submit a completed questionnaire for use by the LifeLines Priority Evaluation Committee. Based on its evaluation, a project may be approved for future funding and depending on resources available to the Ministry, approved for construction in a given fiscal year.

The following table summarizes the status of rehabilitation works, funded under Lifelines, within the RAP area.

### Lifelines Rehabilitation Works Under Way in the RAP Area

<u>Region</u>	<u>City</u>	<u>Total Cost</u>	<u>MOE Grant</u>	<u>Budgets (\$ 1000s)</u>			<u>Percent Remaining</u>
				<u>Prior Years</u>	<u>FY 89-90</u>	<u>FY 90-91</u>	
Metro	Etobicoke	378	126	114	12	0	0
	North York	1043	303	81	56	0	55
	York	445	148	0	112	12	16
York	Richmond Hill	75	25	0	23	2	0
Peel	-	1595	454	371	83	0	0
Total		3,536	1,056	566	286	14	18

\* After FY 90-91

As in the case of the Needs Studies, area municipalities are conducting numerous rehabilitation works on water distribution systems, which have not been included in the table.

### Potential Program Improvements

The RAP has commissioned a study to examine alternative funding mechanisms. Until the results of this study are available and all three levels of government have had an opportunity to review it, any suggested improvements to infrastructure funding programs is premature.

### Potential Program Benefits

Maintaining the sewer infrastructure has several environmental benefits which all arise from reductions in the amount of infiltration entering the sewers. In combined sewer areas this

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can result in fewer exceedences of capacity and hence smaller overflow volumes. In separated systems the reduction of infiltration reduces the volume of influent to the sewage treatment plants. Treatment plant capacity, freed up as a result of infiltration reductions, can be allocated to treatment of combined sewage retained in projects such as the Eastern Beaches Tanks (Component Action 1.1.1)

Many infrastructure improvements do not contribute significantly to environmental improvements. The majority of these projects involve actions to increase capacity of existing systems. Often the intent in increasing available capacity is to allow increased development. While optimal use of existing systems is desirable, the substitution of increased domestic discharge for infiltration does not produce major benefits from a RAP perspective. It is important to clearly identify an environmental benefit in any program that seeks to increase the funding to projects which may further the RAP goals.

### Dependent Projects

None of the projects listed in this document are dependent on changes to the Lifelines Programme. Increased funding will of course allow more rapid progress for any of the remedial options ultimately selected.

### Monitoring Requirements

No ambient monitoring is required under this option.

### Reporting

The Ministry of the Environment prepares summary reports on the Lifelines programme, on at least an annual basis. Information on municipalities within the RAP area will be extracted for inclusion in RAP progress reports.

### Implementation

Documentation of any potential improvements will await the completion of the funding mechanisms study (Component Action 7.1.5). Any decision to increase funding levels requires political approval and will normally be subject to availability of resources and priorities on a particular year. With appropriate agreements in place between the various levels of government, any proposed changes would require a maximum of one year to implement, unless the need for a legislative change is identified.

### Potential Delays

While all parties agree that greater resources must be allocated to remedial measures, agreement on the funding to be provided by different agencies and levels of government usually requires lengthy negotiation. The RAP will act as an impetus to these negotiations and will, by providing cost information as well as public and technical input on the remedial options selected, facilitate the negotiation of commitments.

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### Summary Information for Implementation

Component Action:	Lifelines
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	None
Implementation Responsibility:	Provincial/Municipal
Funding Responsibility:	Provincial/Municipal
Additional Costs Range:	
Monitoring Requirements	None
Reporting Requirements:	annual
Timeframe:	
Potential for Delay	high
Potential Reasons for Delay:	Await completion of C.A. #7.1.5 Negotiation between governments

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### REMEDIAL ACTION # 1.4:      Continue Enforcement and Development of Lakefilling Controls

Lakefilling refers to the placement of solid material (e.g., loose earth, rubble, broken concrete) in or abutting a waterbody (lakes and rivers) to create structures for flood and erosion control (e.g., shoreline protection on stabilization works), land creation (e.g., waterfront parks and recreational boating facilities) and confined disposal facilities for dredged material.

Lakefilling for the purpose of creating additional land has been carried out in Ontario for over a hundred years. Low areas have been filled to make the land useable while other filling operations have simply created additional lands. Within the RAP boundaries, the configuration of the Toronto waterfront has, over the years, been altered by lakefilling. The areas south of present day Front Street are created entirely of lakefill. The Toronto Harbour Trust, followed by the Toronto Harbour Commissioners (THC) in 1911, have been involved in lakefilling for the last 135 years. The THC used 73.5 million m<sup>3</sup> of fill to create a total of 1,010 hectares since 1911. These projects have expanded to Toronto

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Islands by some 600 acres and have created approximately 2,000 acres of land along the Toronto waterfront.

The first area filled was the marsh at the mouth of the Don River. Here, dredged material from the lake was used to create land for harbour development. Subsequently, fill was placed off the Toronto Islands to create parkland. In the 1930's additional fill was placed for development of the Toronto Island Airport. Major lakefilling projects completed or undertaken in recent years include:

- o The Outer Harbour Lakefill (also known as the Eastern Headland, Tommy Thompson Park, or the Leslie Street Spit) is the largest fill project undertaken by the THC. The construction of this project was started in 1959 at the foot of Leslie Street and has resulted in a 4.8 kilometre long peninsula extending southwards out into Lake Ontario.
- o Ashbridge's Bay, a major waterfront recreational area developed by MTRCA, is located in the City of Toronto, just east of the Leslie Street Spit. Lakefilling operations from 1972 created over 17 ha of new waterfront parkland and 7.3 ha of protected water area at a cost of \$3,700,000. The 1.2 million cubic metres of material used for was protected using beaches anchored by armour stone hardpoints. The park was officially opened in 1977 and the land is now in the title of the MTRCA.
- o The Humber Bay waterfront recreation area, developed by the MTRCA, is located in Etobicoke at the mouth of Mimico Creek. The land area is divided into two sections, Humber Bay West and Humber Bay East, on either side of the Mimico Creek. Humber Bay West was completed in two phases, from 1971 to 1974 and from 1975 to 1979, creating 25 ha of land area and 21 ha of protected water area at a cost of \$3,284,152. Humber Bay East was constructed between 1972 and 1978, creating 19 ha of land area and 12 ha of semi-protected water at a cost of \$3,361,130. A total of 5.1 million m<sup>3</sup> of fill was used.
- o Bluffer's Park was developed by the MTRCA and is located in Scarborough at the foot of Brimley Road. A total of 2.6 million cubic metres of fill was placed. Phase I lakefilling operations created a total of 12 ha of land area between 1971 and 1974 at a cost of \$2,200,000. The park consists of crescent-shaped beaches between armoured headlands. Phase II operations created 30 ha of land between 1974 and 1981, at a cost of \$6,000,000. Similar to Phase I, armoured headlands on the east and west side of the island form the arms of the basin and contain a series of artificial beaches. Of the \$6,000,000 cost, approximately \$1,800,000 was used for armouring.
- o Col. Samuel Smith Waterfront Area is located in Etobicoke, between 23rd and 13th Streets. Lakefilling by the MTRCA began in 1983, and by the end of 1989, 18.3 ha of land area had been created (approximately 93% of the approved configuration). The project is scheduled for completion in 1992 at a total estimated cost of \$3,700,000.

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- o The South Marine Drive shoreline stabilization project being undertaken by the MTRCA is located along the shore of Lake Ontario, just west of the Guild Inn in Scarborough. The project involves the stabilization of 1010 metres of the Scarborough Bluffs using an armour stone revetment structure to stop toe erosion of the bluff and extensive slope stabilization measures. Construction of the revetment began in June 1984, by end-dumping an earth fill spine protected with a layer of rubble and a layer of armour stone on the outside face. By June 1987, the basic shore protection structure (including final armouring) was essentially completed at a cost of \$1,600,000. The backshore slope stabilization measures, estimated to cost an additional \$700,000 (1990 dollars), consist of partial buttress drainage features. These measures are scheduled for completion in 1991. Once the backshore is filled in, approximately 5.9 ha of land area will be created at the toe of the bluffs by the placement of 198,000 m<sup>3</sup> of fill.

Other erosion control projects have been under way along the Scarborough waterfront since 1979. Bellamy Ravine, Fishleigh Drive and Guildwood Parkway are major projects which are in various stages of completion.

In addition to lakefills for the purposes of land creation or shoreline protection, lakefills are used to create disposal areas for dredged material. Dredging is often required to keep adequate depths in harbours and approach channels, for boating traffic. Within the RAP boundaries, the Keating Channel at the foot of the Don River is the site of the most intensive dredging activities along the Toronto waterfront. The dredgeate material is commonly placed in dyked containment areas built to retain contaminated sediment. These areas are called Confined Disposal Facilities (CDF) and are in widespread use in the Great Lakes as the predominant method for disposal of contaminated dredged materials. In the case of the Keating Channel, this dredgeate is taken by barge to disposal cells at the Leslie Street Spit.

Creation of new land resources through filling in the littoral (shallow, near-shore) zone is an appealing concept for several reasons. With lakefront property commanding a premium price, the creation of new land by lakefilling is attractive, particularly in the heavily populated western basin of Lake Ontario. In many cases, lakefills provide recreational opportunities that would otherwise not exist and could not be provided through the purchase of existing shoreline properties. In addition, the filling activity provides construction interests with an inexpensive means of disposing of large quantities of surplus excavation material and rubble.

Concerns over the environmental implications of lakefilling that have been consistently raised over many years have recently heightened across Ontario, particularly in the Metro Toronto area.

The impact on the aquatic environment of building lakefills using the present methodology has not been adequately assessed. However, monitoring of existing sites has, in some cases, indicated degraded soil, water and sediment quality and disruption of aquatic

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communities in the vicinity of lakefill structures. Benefits of lakefill sites have also been noted however, in terms of improved fisheries habitat, and corresponding increases in the numbers and diversity of fish species.

Consideration of remedial programs related to lakefilling are documented under two Component Actions in the following sections. Component Action #1.4.1 examines a program to control the quality of material used in lakefilling. Component Action #1.4.2 addresses the broader questions of policy development aimed at defining when and how lakefilling is to be permitted. The section is completed with Component Actions dealing with dredgeate disposal guideline and contaminated sediments.

### COMPONENT ACTION # 1.4.1: Continue Programs for Quality Control of Fill Material

Although the Toronto Harbour Commissioners (THC) initiated construction of the Outer Harbour Headland (Tommy Thompson Park) in 1956, no guidelines concerning the quality of dredgeate or lakefill material were available until 1982. Prior to this, the only form of lakefill quality assurance was a "sight and smell" inspection of truck fill initiated in 1979.

The Lakefill Quality Assurance Program (LQAP) was adopted in 1982 to better control the quality of fill originating from construction projects within the City of Toronto and disposed of at the Leslie Street Spit (Tommy Thompson Park). Under LQAP material originating in the Designated Control Area of Toronto, the central core of Toronto south of Queen Street, was required to have authorization detailing that the material was suitable for placement at the lakefill locations. However, no universal system, to classify fill for the greater Metropolitan Toronto area was in place. Tests conducted in 1986 by MOE determined that despite LQAP, much of the fill being deposited at the Leslie Street Spit was contaminated.

As a result, in 1988, the Ministry of the Environment and The Metropolitan Toronto and Region Conservation Authority developed the Improved Lakefill Quality Control Program (ILQCP). This program was implemented in January 1989. The Improved Lakefill Quality Control Program was designed to provide a consistent Metro-wide guideline for the assessment of fill quality. The Ministry of the Environment has given responsibility of administering this program to the Conservation Authority.

#### Existing Program

The Improved Lakefill Quality Control Program imposes environmental controls on the material to be deposited at lakefill locations. In addition, pre-disposal inspection of sites undergoing development requires the developer to identify previous waste generators and the chemical nature of excavated material prior to acceptance at a lakefill location. The Conservation Authority uses this information to assess the acceptability of material and the appropriate placement location at the lakefill.

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The Program requires that proponents with sites producing 200 m<sup>3</sup> or more of fill (about 20 truck loads) complete an application, which includes a site history audit, and undertake a series of chemical soil analyses, prior to initiation of site excavation activities. These sites are termed "Large". Developers producing excavation volumes smaller than 200 m<sup>3</sup> ("Small" sites) are not required to complete chemical testing or a site history audit but must complete a lakefill application prior to the material being considered for placement at a lakefill facility.

The chemical testing procedures as described below for large sites, present a difficult situation to the Small Site excavator. These sites typically are excavated by swimming pool contractors, landscapers, foundation builders, etc., who may not have much lead time before beginning work. Since the time involved to collect and analyze soil samples may be a month or more, chemical tests were not required as part of the ILQCP, for small sites

The following is a summary of procedures to be followed by proponents wishing to dispose of fill at lakefill locations.

### Large Sites (greater than 20 truck loads).

1. Registration of site by the developer with MTRCA to obtain Application for Bills of Lading.
2. Conduct site history audit.
3. Site investigation and site sampling.
4. Lakefill Bulk Chemical Analysis of site soil/fill samples.
5. Comparison of Lakefill Bulk Chemical Analysis results with Open Water Disposal Guidelines
6. **IF** Lakefill Bulk Chemical Analysis results meet Open Water Disposal Guidelines **THEN** Open Water placement may be possible **OR**,
7. **IF** Comparison of Lakefill bulk analysis does not meet Open Water Disposal Guidelines **THEN**, compare with Restricted Land Use Guidelines (Appendix B).
- 8a. **IF RESULTS LESS THAN** (or meets) Restricted Land Use Guideline, **THEN** Distilled Water Leach Analysis of Site Samples must be completed and compared to the Drinking Water Guidelines to identify the appropriate lakefill disposal location.
- 8b. **IF RESULTS EXCEED** Restricted Land Use Guideline, **THEN** a Regulation 309 Leachate Extraction analysis may be required to identify a suitable disposal option. Disposal of such material will be subject to the guidelines set forth in the Environmental Protection Act Part V; Regulation 309.
9. Completion of Application including site history audit and chemical analysis results if ILQCP Guidelines have been met.

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10. Submission of Application to MTRCA.
11. Confirmation and review of chemical testing results by MTRCA.
12. Decision by MTRCA on environmentally safe lakefill disposal location.
13. Excavation and disposal of material in approved location as authorized on Bills of Lading.

### Small Sites (5 to 19 truck loads)

1. Registration of site by the developer with MTRCA to obtain Application for Bills of Lading.
2. Completion of Application (site history and chemical analysis may be required).
3. Submission of Application to MTRCA.
4. Confirmation and review application by MTRCA.
5. Decision by MTRCA on an environmentally safe lakefill disposal location.
6. Excavation of material.
7. Bills of Lading issued for sites conditionally accepted.
8. Disposal of material in approved lakefill location as authorized by the MTRCA after gate inspection by lakefill staff.

Note: Very small operators, producing less than 5 truck loads, may make application at the landfill facility at the time of disposal. These small operators are subject to inspection by the gate operator only.

At the lakefill location, trucks arriving from all sites are subject to a visual inspection before access is granted to the facility. The vehicles from Large Sites have Bills of Lading which show the gate inspector that the material has been inspected and is conditionally suitable for lakefill placement. Small Sites loads are accepted to the lakefill location on a load by load basis only, depending on the gate inspector. An instrument to measure the total volatile content of the fill is be used to screen material originating from all sites.

In July 1989, the Toronto Harbour Commissioners decided to preclude all untested fill (including Small Sites), from Outer Harbour Lakefill. Since then MTRCA has been accepting no untested material at that site. The Authority has continued to accept untested material from small sites at other locations where fill is placed in a protected disposal area (ie no contact with the Lake). Conservation Authority records indicate however, that approximately 80% of these Small Sites loads are going elsewhere. Although some of

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these trucks may be going to one of the erosion control projects still ongoing along the Scarborough waterfront, there is no real mechanism to determine where these loads are being taken.

In addition to the above details of the Program, the Authority audits all aspects of ILQCP daily. The audit procedures include site visits, inspecting trucks, random chemical testing and Application reviews. Developers are not given any information as to the time or location of these audits, which are conducted by two roving site inspectors. A typical audit consists of an inspector visiting a site to view the type of material being loaded to ensure that only approved fill is being transported. Any irregularities are called in to the gate inspector at the lakefill where the load will be refused.

Violations of the ILQCP can result in the contractor being denied access to the lakefill location and notification of the Ministry of the Environment for possible prosecution. In 1989, a total of 30 violations were recorded, 27 related to small projects. Ten of the violations were against disposal companies. During the first year, the action taken varied from issuance of a warning to a suspension of dumping privileges at lakefill sites for up to 1 month.

The 1989 ILQCP cost \$ 415,000 with all funding generated through tipping charges which are currently set at \$10 per load. Disposal at the Leslie Street Spit carries an additional charge of \$14 per load, which accrues to the Toronto Harbour Commissioners and is not utilized in funding the fill quality control program. The MTRCA employed nine staff at its various lakefill locations during 1989, acting as site inspectors and data entry clerks.

### Potential Program Improvements

The existing program administered by MTRCA is an interim measure which is being used to control the quality of fill being placed in existing lakefills. The program will be revised to comply with the Provincial Lakefilling Policy (Component Action #1.4.2) once its development is complete. The following are potential improvements to the existing program, primarily from an operational perspective, which could produce a more efficient system of control. Under each potential improvement several sub-actions are noted. In most cases, overall program costs not are provided for these potential improvements. The existing system is designed to be self-supporting and the fees are set accordingly. It is expected that this will continue, with fees being adjusted to allow the implementation of the options selected through the RAP consultation process.

#### **A. Revise the Existing Fee Structure and Allocation of Resources**

1. Impose a non refundable application fee of \$25.00 for all projects generating <200 m<sup>3</sup> of material, and \$100.00 for projects of 200 m<sup>3</sup> and greater.

**Rationale:** This fee will be used to offset costs for site inspections, on site testing if required, and processing of application.

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### **B. Increase Inspection Requirements**

1. Eliminate the 1 to 5 load (small site) category to ensure all projects are inspected prior to issuing of Bills of Lading.

**Rationale:** Under the current program, Small Sites are now divided into those generating 5 truck loads or less, and those generating between 6 and 19 loads. Truck operations from these very small sites can presently obtain Bills of Lading on the spot at the lakefill location without soil testing or site inspections. This can lead to cheating whereby a truck operator may move from one location to another, disposing of 5 loads at each. This would not be discovered until the following day.

2. Require Bills of Lading for all material (including rubble), and require a site inspection.

**Rationale:** Trucks are permitted to use a cushion of fines under rubble so as not to cause damage to the box. This practice allows large volumes of unapproved fill material to be deposited at lakefill sites each day.

### **C. Improve Operation Efficiency**

1. Investigate "quick test" methods.

**Rationale:** This technology has exciting prospects. The MTRCA is currently investigating the potential for a quick-test device for use at lakefill locations. This could take the form of a "wand" which might be inserted into the fill to test for certain contaminants. Other possibilities, such as a rapid bacterial bioassay test are also being assessed. These additional testing procedures would provide a more quick and general indication of fill quality, and would supplement the site inspections and soil tests.

### **D. Increase Educational Activities**

1. Update the Improved Lakefill Quality Control Program manual to include any changes.

**Rationale:** The Manual must be revised to reflect any changes to the Program. All current manual holders should be contacted to ensure they receive new manual.

2. Prepare slide or video presentation to educate all sectors of the development industry; associations of contractors, etc.; developers; truckers; consultants; politicians; municipalities; and Authority boards and committees.

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**Rationale:** This program has a significant impact on a broad spectrum of people and agencies. It has new ideas and all persons with an interest in lakefilling either directly or indirectly, must be informed.

### **E. Conduct Operational Research and Develop Database**

1. Secure and highlight municipal zoning maps for approval process.

**Rationale:** To assist in identifying potential soil contamination due to proximity of industry. This will assist staff in carrying out a site visit.

2. Work with municipal building departments to supply information package from Authority to all building permit applicants.

**Rationale:** Virtually all sources of fill material will have made application to a municipality for a building permit before excavation or demolition has commenced. The same applicant should be made aware of the Lakefill Program and applications for Bills of Lading made available at that time.

3. Investigate in-land disposal of fill material.

**Rationale:** Fill rejected at lakefill sites may still be contaminating the lakes and rivers of the watershed.

4. Research site histories of all residential areas in the region.

**Rationale:** To help staff identify potential environmental concerns in areas which otherwise appear environmentally acceptable. Estimated cost \$ 100 K.

### **F. Upgrade Equipment and Staff Resources**

1. Purchase of computerized system

**Rationale:** Provide instant verification, acceptance, and computer updating of Bills of Lading when presented. Allows site operators to accept only bills from approved, active projects. Will eliminate need for data entry clerk. Estimated cost \$ 50 K.

### Potential Program Benefits

The existing program of fill quality control was instituted in 1989 and represents a significantly improved version of the Lakefill Quality Assurance Program (LQAP) which had been in place for several years. The previous program required testing of major sites only and was restricted to the City of Toronto. Results of MOE soil sampling indicated that the program was provided insufficient protection. The current program requires a

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much more extensive analysis, both in terms of the chemicals tested and the applicability of testing requirements. The new program will continue to be audited to ensure that it provides the desired degree of environmental protection. The potential improvements cited are operational in nature and are essentially fine tuning, based on the experience of the MTRCA staff administering the program.

### Dependent Projects

The program for the control of lakefill quality is an interim program which is dependent upon the final development of a provincial Lakefill Policy (Component Action # 1.4.2). One of the options to be considered in discussions regarding the policy is the current program.

While lakefilling is receiving paramount attention at the present time, development of a comprehensive materials management strategy, to provide for the environmentally sound usage of excess excavated material and dredged sediments is required. Excavation and the need for disposal sites will continue to be a major concern in the Metro area in the future. Landfill sites, already overloaded, will often not accept excavated material. A large portion of the complaints handled by MOE's Regional Abatement office involve illicit disposal of excavated material in ravines and unopened road allowances.

The existing quality control program and any future lakefilling policy will have resource implications on municipalities. Municipalities currently must pay for testing of materials removed during road and sewer infrastructure. With analyses typically costing approximately \$1000 per sample, the costs can be significant. While the resource drain must be borne to ensure continued quality control of fill, the requirement does reduce the overall budget available for municipal works.

The current quality control program is based on the existing MOE Open Water Disposal Guidelines. These will likely be replaced in future by effects based sediment quality guidelines (Component Action # 1.4.4).

### Monitoring Requirements

The monitoring requirements of this Program are already in place. On-site soil sampling from various bore holes is currently required as are random samples from active construction sites. In-lake monitoring through the Authority's Waterfront Monitoring Program is already occurring.

The foregoing aspects of the ILQCP are supplemented by an aquatic monitoring program which assesses environmental implications of lakefilling activities. As part of this work, all waterfront erosion control sites are evaluated using electroshocking and scuba techniques. Electroshocking is done to inventory shoreline areas for the presence or absence of fish before and after the project. Scuba reconnaissance is completed to assess habitat changes as the lakefill project proceeds. Annual reports are produced by Authority staff.

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Various other lakefill quality projects are also conducted by Authority staff. In these studies, samples of lake water and bottom sediments are collected and compared from various waterfront parks already established as well as those under construction. Included in these projects are sediment traps surveys, biomonitoring benthic invertebrates analysis, water quality and fisheries surveys, and sediment quality.

### Reporting

MTRCA has established a reporting system for the existing program. The RAP will include a summary of the results, including necessary audit information as part of its annual report.

### Implementation

As indicated earlier, this is an existing program. Future changes are dependent upon development, review and adoption of Sediment Quality Guidelines, Lakefilling Policies and a materials management strategy. The Potential Improvements cited in this document could be implemented within a one year timeframe.

### Potential Delays

No delays are anticipated for the improvements identified.

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### Summary Information for Implementation

Component Action:	Lakefill Quality Control
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Lakefill Policy Development Sediment Quality Guidelines Materials Management Strategy
Implementation Responsibility:	MTRCA, MOE
Funding Responsibilities:	proponent
Additional Costs Range:	most options self supporting Option E: \$ 100 K (MOE cost) Option F: \$ 50 K (MOE cost)
Monitoring Requirements:	existing
Reporting requirements:	existing/RAP annual report
Timeframe:	existing program changes dependent on other actions
Potential for delay;	low
Potential Reasons for delay:	

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### COMPONENT ACTION # 1.4.2: Finalize and Implement Provincial Lakefilling Policy

Based on the environmental concerns associated with lakefilling, the MOE commissioned a study on lakefilling in Ontario (EAG 1988). This study examined all aspects of lakefilling ranging from the numbers of projects carried out, to the environmental and socio-economic impacts of lakefilling.

The document resulting from the EAG study provided background information for a Lakefill Policy Development Committee formed in March, 1988 to develop MOE policies to ensure that lakefilling will be carried out in an environmentally sound manner. The Committee was comprised of representatives of the Ontario Ministries of the Environment (MOE) and Natural Resources (MNR), Environment Canada and the City of Toronto.

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The activities of the Lakefill Policy Committee included the following steps.

1. A review of existing MOE Regulations and policies with potential applicability to lakefilling.
2. Documentation of the concerns (potential and actual) associated with lakefilling.
3. An evaluation of the documented concerns in light of applicable Regulations and policies.
4. Development of minimum performance requirements that must be met in order to comply with existing policies and Regulations.
5. Development of a procedure to address the environmental impacts associated with fill quality.

Because site-specific conditions across the Province vary, and the ways in which minimum performance requirements can be met, the Committee concluded that the onus will be on the proponent to develop appropriate measures that suit conditions at the proposed lakefill site. However, because the environmental impacts associated with chemical contaminants in fill are independent of site-specific conditions, standardized procedures are required.

In addition to the procedures (options) developed by the Committee, the MOE is providing other options for protecting water quality in relation to lakefilling activities. They are discussed in this document so they can be considered and reviewed by the public. The major differences among the options are the chemical and biological tests suggested for evaluating fill quality. The MOE will use the information obtained through public discussion to formulate a policy on lakefilling.

### Existing Programs

Although there are no specific provisions on lakefilling within existing MOE policies or Regulations, there are requirements regarding the disposal of material at any location, which thus includes a lakefill. These requirements are outlined in MOE Waste Regulation 309. As well, the policies outlined in Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment (MOE 1984) are applicable to lakefilling, since a lakefill is by definition a structure in or abutting a waterbody. These requirements in relation to lakefilling are discussed below.

### **Waste Regulation 309**

Material to be used in a lakefill must meet the requirements of a non-registerable waste as defined in Regulation 309. This regulation, under Part V of the Environmental Protection Act provides the mechanism for classifying material on the basis of potential hazards which are determined according to the degree of chemical contamination. The reason for not allowing material designated as a waste to be used in a lakefill is the assumption that lakefills are not repositories for wastes. Under Regulation 309, wastes must be disposed of in facilities built according to specific standards.

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The protection of ground and surface waters during and following construction of a lakefill is of paramount importance. State-of-the-art procedures for constructing and maintaining lakefills within or abutting an aquatic environment do not provide the assurances that chemical contaminants in lakefill material can be placed and retained in perpetuity without loss to ground or surface water. The best mitigative measure, therefore, is to avoid placing such material in a lakefill.

### **Water Management: Goals, Policies, Objectives and Implementation Procedures**

Lakefilling activities must be conducted in accordance with the policies in MOE's Water Management. For regulatory purposes, a lakefill will be considered as a "direct discharge" during its construction phase, and provisions for controls will be similar to those imposed on effluent discharges. In this regard, Policy 5 of the Water Management document regarding mixing zones will apply during construction of a lakefill; after construction, Policy 5 will not apply.

A lakefill, by definition, is constructed in or abutting a waterbody and therefore can potentially affect water quality and uses. Lakefilling activities must therefore be conducted in accordance with the MOE Water Quality Management Goal: **"To ensure that the surface waters of the province are of a quality which is satisfactory for aquatic life and recreation"**. A lakefill can be appropriately considered as an effluent discharge during the construction phase when it bears many similarities to other industrial point source discharges.

### **Application of Regulations/Policies**

Requirements in Regulation 309 can be met only if the quality of the material used in lakefills meets the numerical criteria specified. Complying with the policies in Water Management requires the potential impacts on the aquatic environment from lakefilling activity be identified and prevented or mitigated by employing minimum performance criteria in the design, siting, construction and operation of a lakefill.

It must be pointed out that existing requirements and even the finalized Ministry policy on lakefilling, do not exempt a lakefill proponent from other existing legislative requirements of MOE such as the Environmental Assessment Act, or the requirements of other Ministries (e.g., MNR) or other agencies (e.g., federal or municipal) that are not specifically addressed in this document. Under existing conditions, where a provincial agency is the proponent, large-scale projects are likely to be subject to the Environmental Assessment Act; small-scale projects require approval from the MOE Regional Office.

Federal projects involving lakefilling (navigational dredging, small-craft harbours) are also assessed on a case-by-case basis, and some can be subject to federal environmental assessment requirements. In most cases, provincial agencies have input into the evaluation. The decision on the placement of candidate material is based entirely, unless otherwise requested by the province, on the Open-Water Disposal Guidelines. Material meeting these

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Guidelines can be placed in open water (unrestricted); material not meeting them is usually placed in a confined lakefill.

### Potential Program Improvements

The Ministry has prepared a working paper on a proposed policy for lakefilling in Ontario and is expected to proceed with public review and consultation in the near future. The working paper provides background and documents the current situation, and suggests minimum performance criteria under the following headings:

- Siting and Design
- Construction
  - Turbidity
  - Sedimentation
  - Chemical Effects

It is the Province's intent to invite public comment, prior to adopting any policy. The Toronto RAP, with its PAC and TAC committees is intended to be one of the vehicles used to solicit input on the policy.

Further comment on a lakefilling policy has been deferred at this point in the RAP development, pending release for public review.

### Program Benefits

Lakefilling has been and continues to be a contentious issue along the Toronto waterfront. There is evidence of both the detrimental and beneficial aspects of the practise. The lack of a clear and comprehensive policy has led to a variety of problems. The completion of a specific policy will allow consistent criteria to be applied in decisions involving lakefilling.

### Dependent Projects

The main dependent project which could be affected by the lakefill policy is the proposed expansion of the Main STP. As discussed under Component Action # 2.1.1, lakefilling would be required if capacity is to be increased to allow acceptance of retained combined sewer overflow or flows diverted from the North Toronto STP (if it were to be abandoned). In addition, the lakefill policy could affect as yet unspecified remedial projects, such as habitat creation.

### Monitoring Requirements

Regardless of the form of the policy adopted there will be the need for ambient monitoring of the water column, sediments, and biota in order to ensure that the policy is being effective. Effectiveness will need to be judged not just on a chemical or bioaccumulation

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basis, but also according to the requisite performance criteria, especially during construction. In addition, monitoring of biota in embayments created by lakefilling will be a useful indicator of the overall progress of source control across the entire waterfront. This of course pre-supposes that localized sources of contamination such as storm outfalls will be addressed as an early action in the remedial action plan schedule.

### Reporting

Extensive chemical testing will be required under any lakefill policy. The results of these tests will be available for public review. In addition an audit of the program should be undertaken to ensure the effectiveness of testing procedures. The results of this audit should be published yearly as part of the RAP reporting framework.

### Implementation

Implementation considerations will depend on the policy.

### Potential Delays

With such a contentious issue public and agency comments are likely to cover a very wide range and consensus building will be difficult. Strong lobbies already exist for both continued filling and curtailment of the practise.

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### Summary Information for Implementation

Component Action:	Lakefill Policy
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Main STP Habitat Creation
Implementation Responsibility:	Province
Funding Responsibility:	
Additional Costs Range:	
Monitoring Requirements	ambient + performance criteria
Reporting Requirements:	annual
Timeframe:	1991
Potential for Delay	high
Potential Reasons for Delay	Polarized Opinions

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### COMPONENT ACTION # 1.4.3: Update Policy on Disposal of Dredged Material

Dredging is defined as the planned, mechanical movement of material located below the surface of a waterbody, or at the land/water interface. Environment Ontario has established a set of guidelines (Open-Water Disposal Guidelines) to govern dredging operations in order to protect the receiving environment according to the physical, chemical and biological quality of the material being dredged. Sediments to be dredged are classified into two groups, contaminated and uncontaminated, based on numerical guidelines which are constantly reviewed and updated. Ministry guidelines are available, specifying several disposal options depending on the degree of contamination.

#### Existing Programs

Existing practice is that major dredging activities undertaken by the provincial and municipal governments are subject to the Environmental Assessment Act (EAA). Federal activities may be reviewed under the Federal Environmental Assessment and Review Process (EARP). The effect of these practices is that each dredging project is considered on a case by case basis, with water quality effects, biological effects, and social and economic factors being taken into account.

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The key to the management and disposal of dredged material in current practice is the dredged material classification process. Based on a series of analyses the material may be classified as:

- A. Suitable for open water disposal
- B. Suitable for unrestricted use on land
- C. Suitable for restricted use on land
- D. Contaminated material requiring specialized disposal at a certified confined disposal facility (CDF), with dewatering permitted
- E. Severely contaminated material requiring specialized disposal at a certified confined disposal facility (CDF), with dewatering prohibited

Since the early 1970's the most commonly used mode of disposal for dredged materials in the Great Lakes basin has been in confined disposal facilities (CDF). This practice restricts the dispersion of sediments during placement.

A CDF must be designed and managed to retain contaminated materials without impairing the quality of adjacent waters, and without creating subsequent contaminant pathways. As a long-term structure, its siting should consider compatibility with existing and proposed land and water uses. Environment Ontario has developed guidelines for siting, facility design, facility usage, and facility de-commissioning of CDFs.

Unconfined open water disposal of dredged material is permitted for materials classified as being suitable. Again, Environment Ontario has developed guidelines for site selection and evaluation.

### Potential Improvements

In general it is felt that the procedures involving disposal of dredged materials are acceptable because of the provisions of the Environmental Assessment Act (EAA) and the Environmental assessment and Review Process (EARP). The primary improvements which can be made, entail constant upgrading of the guidelines so that the most up to date scientific information is continually applied.

Environment Ontario's latest publication respecting dredging is a handbook entitled "Evaluating Construction Activities Impacting on Water Resources" (1976). Since the time of that publication, many changes have been made to policies and procedures. Environment Ontario has therefore decided to produce a series of updates. Part III of this series entitled "Handbook on Dredging and Dredged Material Disposal in Ontario" has been produced and is expected to be released early in 1990.

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### Potential Benefits

No particular benefits are anticipated as no major changes are proposed. The updating of the handbook will ensure a consistent approach to dredging by regulatory authorities across the province.

### Dependent Projects

No component actions documented in this report are dependent upon the revised publication of guidelines. The options for dredging and disposal could be effected by the final adoption of a lakefill policy. Depending on the policy selected, future construction of CDFs could become impractical.

### Monitoring Requirements

None.

### Reporting

No reporting required.

### Implementation

Release of the handbook requires approval by MOE's Policy Committee. Efforts are under way to secure this.

### Potential Delays

Delays in getting approval due to other priorities.

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### Summary Information for Implementation

Component Action:	Update Dredging Policy and Procedures
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Lakefill Policy
Implementation Responsibility:	Province
Funding Responsibility:	Province
Additional Costs Range:	No New Costs
Monitoring Requirements	None
Reporting Requirements:	None
Timeframe:	1990
Potential for Delay	medium
Potential Reasons for Delay	Approvals

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### COMPONENT ACTION # 1.4.4: Develop Strategy and Options for Dealing with Contaminated Sediments

In the early 1970's, the Ontario Water Resources Commission (OWRC) developed sediment guidelines for evaluating dredged material for open-water disposal. These were later formalized in a document published in 1976 (Persaud & Wilkins 1976).

These guidelines provide basic guidance on environmental protection but are not totally satisfactory for assessing the biological significance of contaminants in in-situ sediment. Part of the Ministry's sediment programs (eg. The In-Place Pollutants Program) over the last five years has been designed to obtain information that will provide a better understanding of the biological significance of contaminants in sediment. Based on the Ministry's data, and information from other sources, such as the U.S. Environmental Protection Agency (U.S. EPA) and the U.S. Army Corps of Engineers (U.S. C.O.E.), there is an adequate data base to embark on the development of biologically-based sediment quality guidelines.

In view of the many issues associated with contaminated sediment, as exemplified by various Areas of Concern around the Great Lakes (IJC 1985, 1986), sediment quality guidelines must be broad enough in scope to address all the major concerns. Biologically based sediment quality guidelines cannot be limited to the protection of organisms that are directly impacted, namely the sediment-dwelling species, since sediments can be a source

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of contaminants to the entire aquatic food chain. The guidelines must consider risk implications, through the consumption of fish, that extend beyond the aquatic ecosystem to wildlife and humans.

Recognizing that sediment contamination is a widespread and continuing problem, the guidelines must also be comprehensive enough to provide guidance in decision-making with regards to setting effluent discharge limits to eliminate future problems. They must also provide guidance in determining the need and type of remedial action that may be required to improve conditions in those areas where sediment contamination exists.

### Existing Programs

Sediment contaminant problems have defined a critical need for a strategy for the management of contaminants in sediments. However, a management strategy cannot be implemented without the prior development of guidelines that address the significance of contaminant levels in sediments. Environment Ontario has initiated development of Sediment Quality Guidelines (SQG) and it expected that these will be released for public review in mid 1990.

In general, the concerns which the Provincial Sediment Quality Guidelines will address can be summarized as follows:

1. Lethal and sublethal effects of sediment-associated contaminants on benthic organisms.
2. Bioaccumulation of contaminants from sediments by benthic biota and the potential for food chain transfer and biomagnification.
3. The release of contaminants from sediment to the overlying water.

In recognition of the need to present sediment guidelines in a management framework to be used in setting discharge limits and effective remedial action, three levels of guidelines will be provided.

A No-Effect Level indicating that at such a level all biological resources will be protected. Other water quality and use guidelines will also be met at this level.

A Lowest Effect Level indicating a level of sediment contamination that can be tolerated by the majority of benthic organisms.

A Limit of Tolerance indicating the level which would be detrimental to the majority of benthic species.

The guidelines are intended to provide environmental protection in the sense that sediment contamination above set limits should not be permitted and loadings should be controlled to prevent exceedence of these limits. If limits are exceeded, then a management response is required.

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The No-Effect Level will be used to define those areas where sediments are essentially uncontaminated with respect to effects on aquatic biota. Areas where such sediments exist must be protected by tailoring new discharges and loadings to ensure the levels are not exceeded.

The Lowest Effect Level is a demonstrated "effects" level, indicating some degradation of sediment quality has occurred. A management response is required where concentrations of one or more contaminants exceed these levels. Efforts should be made to identify and evaluate the biological effects and to control the sources in order to reduce these levels. Additional degradation of sediment quality would not be permitted in these areas and effluent limits for new discharges must take into consideration the existing sediment contaminant levels. The goal of all management actions should be to reduce contaminant concentrations to the No-Effect Levels.

Where contaminant concentrations are between the No-Effect Levels and the Lowest Effect Level, monitoring should be initiated to verify that no biological effects are present.

Areas where the concentrations of one or more contaminants are at or above the Limit of Tolerance would be regarded as highly degraded sediment and immediate management action would be required. Investigations of such areas must be carried out to determine the causes and sources of these elevated levels of contaminants. Where these levels are not due to unusual natural background concentrations or the biological responses are not due to other environmental factors such as habitat characteristics, in-situ remedial action may be required in addition to source control. The management goal would be to reduce all contaminant concentrations to the Lowest Effect Level and subsequently to predict recovery to the No-Effect Levels.

Levels ranging between the Lowest Effect Level and the Limit of Tolerance can be reduced through source control. However, in certain instances the time required to effect substantial reductions through source control may not be adequate. In such cases detailed site-specific studies must be carried out to determine the need for, and feasibility of, various actions to enhance the cleanup.

It is recognized that some areas, due to duration and extent of previous contamination, may require extended periods of time for remediation to be effective. In such cases, especially where extensive areas are affected, remedial action other than source control may not be feasible. Such areas would require continued monitoring in order to both ensure that further degradation is not occurring and to predict recovery.

Concurrent with the SQG development the Ministry is also developing options/procedures for the restoration of degraded sediment. These options will embrace the "cradle to grave" concept of contaminant management to provide safe removal, handling, and disposal of contaminated sediment. The options will range from the "do-nothing" scenario to full scale *in situ* remedial action.

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### Potential Improvements

No acceleration or improvements to the existing program are envisioned at this time. Studies and action according to the criteria established will be undertaken once the guidelines have been established and there has been public and agency input. In dealing with remediation of in-place sediment, consideration will have to be given to how much should be spent prior to significant clean-up of existing sources of contamination.

### Potential Program Benefits

Routine evaluation of the significance of contaminants in sediments is currently a difficult task because of the lack of adequate guidelines. The Open-Water Disposal Guidelines, developed during the early 1970's (Persaud & Wilkins 1976), were not designed to address the significance of contaminants in in-situ sediment but were designed exclusively for open-water disposal of dredgeate and only incidentally provide general guidance on environmental protection.

These guidelines are not "effects" based, that is, exceedence of a target value cannot be associated with specific impairment of biota or other beneficial uses. They therefore provide little support for determining the need for action or justifying expenditures to treat or remove the contaminants. As noted in the Metro Toronto RAP Stage 1 report, the highest sediment contamination levels are found near point sources and tributary mouths, but the contaminant level in biota in these areas are often similar to levels found in the biota in relatively clean areas of the waterfront. At the present time it is difficult to establish the priorities for clean up of sediment in specific areas.

The establishment of effects-based criteria will allow the formulation of a strategy for prioritizing sediment clean up. The guidelines for the evaluation of sediment will provide the basis for determining when sediments are considered clean, what levels of contamination are acceptable in the short-term and when contamination is severe enough to warrant significant remedial action.

### Dependent Projects

While no component action outlined in this document is dependent upon the development of sediment quality guidelines or a strategy for dealing with in-place sediment, it is likely that their development will have an influence on effluent discharge targets and long term prioritization of resources for implementing remedial actions.

The guidelines will be important in designing future monitoring strategies aimed at measuring progress under the RAP and will likely be used as one of the criteria in judging ultimate restoration of the ecosystem.

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### Monitoring Requirements

Studies used in the development of the RAP have contributed to the database necessary for the development of the guidelines. Future RAP monitoring of sediments will be part of the long term monitoring strategy and will provide information for the continual refinement of the guidelines. The sediment survey described under Component Action # 7.1.3 was initiated partially in recognition of the need for a stronger database on the baseline sediment quality, so that the results of future remedial actions can be assessed.

### Reporting

The sediment quality guidelines are expected to be released in June of 1990. Annual progress reports will include assessments made on the basis of these guidelines. It should be recognised that under existing laboratory loads, analysis of sediment samples usually requires about a year. The results of the sediment survey conducted under Component Action # 7.1.3 are therefore not expected until late 1990 or early 1991.

### Implementation

All mechanisms are in place for the completion of the sediment quality guidelines. The guidelines and attendant strategies for implementation will be subject to cabinet approval prior to release. Development of strategies specific to the Toronto area will likely require additional biological analyses and these will be subject to the funding constraints and prioritization established through the RAP development process.

### Potential Delays

It is anticipated that the need for additional biological data and the need to establish a strong start in implementing measures aimed at reducing sources of pollution prior to actions to restore in-place sediments will delay any action on in-situ sediments until at least 1995.

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Summary Information for Implementation

Component Action:	Sediment Quality Guidelines and Strategy
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	None
Implementation Responsibility:	Federal/Provincial
Funding Responsibility:	Federal/Provincial
Additional Costs Range:	Not costed - existing budget
Monitoring Requirements	yes/RAP progress
Reporting Requirements:	RAP annual report
Timeframe:	1990 - Guidelines released
Potential for Delay	high
Potential Reasons for Delay	Resources, Rap priorities

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### REMEDIAL INTENT #2

#### REDUCE THE IMPACTS OF TREATED AND UNTREATED SANITARY SEWAGE

##### Summary of the Problem

The Toronto region rivers and Lake Ontario receive discharges of treated sanitary sewage from sewage treatment plants (STPs), diluted or partially treated discharges from treatment plant by-passes and combined sewer overflows, and raw sewage from storm sewers containing sanitary cross connections. The quantities of raw or diluted sewage from storm sewers, combined sewer overflows, and treatment plant by-passes are small and do not have an impact on the majority of beneficial uses. They do have an impact on swimming, due to their bacterial load.

The sewage treatment plants remove significant quantities of nutrients, heavy metals and toxics, but they also "pass through" sufficient loads of these materials to impact the ecosystem. The treatment plants are typically well operated and do not contribute to bacterial loadings since all effluent is chlorinated.

Except for the STPs, the programs discussed in the following sections concentrate on the problem of bacterial pollution. The main impaired uses are therefore swimming and other forms of body contact recreation. Non-bacterial impacts of the sewer systems are considered further under Remedial Intent #'s 3, 4 and 7.

Dry weather discharge from storm sewers is a significant source of bacteria to our rivers and the lakeshore. This is true for both bacteria and chemical contaminants. Although the discharge quantity is small at any particular time, its continuous nature produces almost constant exceedences of health related guidelines in our rivers. Dry weather discharge can add to the water quality problems associated with wet weather by "seeding" sediments with bacteria and chemicals. These contaminants are resuspended when the flow increases during wet weather. The main sources of dry weather discharge are illegal residential cross connections to storm sewers and are difficult to remediate. They are dispersed throughout the cities, occur intermittently, and individually are small in quantity. The remedial programs aimed at dry weather sources are relatively expensive, labour intensive and dependent upon the cooperation of citizens.

Combined sewer overflows (CSO) occur in the older parts of Metro where a single sewer conveys both sanitary sewage and stormwater. Under dry conditions all flow is conveyed to the water pollution control plants. When it rains, stormwater enters the sewer system, mixes with sanitary sewage and increases flow volumes until the sewer capacity is exceeded and overflow occurs. The capacity of the system is up to five times the normal dry weather flow, beyond this point, excess flow is discharged directly to the rivers or the lake at overflow sites.

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Where there is a capacity exceedence, combined sewage can back up into basements, causing flooding and also health hazards.

Five water pollution control plants (STPs) discharge within the Metro Toronto RAP area. The three largest, The Main, Humber Bay, and Highland Creek plants, discharge to Lake Ontario. The North Toronto plant discharges to the lower Don River and the Kleinburg plant discharges to the upper Humber River. The four largest plants are conventional activated sludge (secondary treatment) facilities with continuous phosphorus removal. The small Kleinburg plant is an extended aeration facility. Remedial programs aimed at reducing the impacts of STP discharge include: effluent control; source control; and system improvements.

The MISA program will have a significant impact on municipal effluents. Source control measures in particular will reduce the loads coming to the STPs. The characteristics of both influent and effluent vary greatly from facility to facility within this sector because of the mix of industries discharging to the sanitary sewers. The Metro Toronto RAP will work with the available interim programs, such as the Model Sewer Use By-law, until the MISA program is in place.

### REMEDIAL ACTION # 2.1:

#### Expand and Improve Sewage Treatment Plants

Most remedial measures to reduce the impacts of sewage discharges are for upgrade or expansion of the STPs or sewer infrastructure leading to the plants. Projects are prioritized and implementation and construction are scheduled over years or even decades. Most plant improvements are capital works projects and require lengthy planning, design and construction time. Some projects require additional time for environmental assessment prior to commencing. Many projects are dependent upon completion of other projects, therefore funding and scheduling priorities must be assessed for each project and each treatment plant. Goals for water quality should be considered in tandem with priorities for increased and/or accelerated spending levels.

Large financial commitments are required for expansion and improvement of STPs and related infrastructure projects, these costs are largely borne by the taxpayer. The major source of STP funding is Metropolitan Toronto Department of Works, Water Pollution Control Division. A summary of the funding categories and the estimated costs for the current five year Capital Works Program follows:

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### CAPITAL BUDGET REPORT FOR 1990 -1994

#### PROJECTS IN PROGRESS

	Gross Est. Cost	Total 1989-94	Balance to Complete
Humber T P	304,251,000	148,917,000	155,334,000
Main T P	1,654,628,000	548,223,000	1,106,405,000
Highland Crk T P	217,826,000	99,239,000	118,587,000
North Toronto T. P.	6,706,000	4,147,000	2,559,000
Sewer Sep Subsidies	44,260,000	44,260,000	0
Sewer Syst. Improve	61,769,000	11,709,000	50,060,000
Equipment Replacement	<u>114,188,000</u>	<u>72,454,000</u>	<u>41,734,000</u>
TOTAL	2,403,628,000	928,949,000	1,474,679,000

These figures represent total estimated capital expenditures for water pollution control capital projects. Operation and maintenance costs are in addition to these totals. Provincial subsidies and Municipal revenues are the major sources for these capital works.

The STPs are the principal means of reducing the pollution which would otherwise result from the concentration of industry and residences found in a major metropolitan area. Although they remove large quantities of contaminants, the residual discharge from STPs contribute a large load of pollutants to the waterfront. The three major STP discharges account for nearly 45% of the water entering the lake along the Toronto waterfront. As a result, the STPs are the dominant point sources of nutrients, metals and organics. They are a relatively small source of bacteria because the effluent is chlorinated to kill bacteria.

The Lake and the Don River suffer from various problems which involve the STPs. The Component Actions discussed in this section deal primarily with improvements and expansions which are necessary to provide capacity to treat existing and future flows. Actions which will be required to improve the level of treatment provided or reduce the impact of the effluent on the receiver will be discussed further in other sections. The main problems associated with STP discharge are listed below, together with the section number where they are addressed.

<u>Problem</u>	<u>Plants Affected</u>	<u>Initiative</u>	<u>Report Section</u>
Total Load	all	Sewer Use Bylaw	2.2.3
Pass Through	all	MISA Pilot Site	7.2.2
Phosphorus	all/Humber	Plant	2.1.1; 2.1.2
By-Pass	Humber/Main	Plant	2.1.1
Contaminated Zone	all	MISA Pilot Site	7.2.2
CSO Treatment	Humber/Main	Plant	2.1.1; 2.1.2
		Sewers	2.2.1
Effluent Toxicity	all	MISA Pilot Site	7.2.2

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The main purpose of this list is to make clear that all problems associated with the STPs cannot be addressed through improvements or expansions to existing facilities. There are additional needs in terms of source control and determination of receiving water impacts which must also be addressed.

For those problems which can be addressed through plant improvements, the projects which can be under taken are usually based on one of the following reasons:

Maintain or Improve Existing Plant Efficiency

Provide Additional Capacity for:

- i) Operating Reserve
- ii) New Development or Redevelopment
- iii) Retained Combined or Storm Sewer Flow

Meet Regulatory Requirements

Reduce Impacts on the Receiver

Other Factors (Worker Safety, etc.)

The various projects proposed or under way at the different STPs will be discussed in relation to these reasons.

### COMPONENT ACTION # 2.1.1:

#### Main Treatment Plant Improvements

The Main Treatment Plant at Ashbridges Bay serves the largest area of Metropolitan Toronto and treats sanitary waste and some industrial flow. Wet weather (storm) flows up to the capacity of the tributary interceptor and trunk sewers can also enter the plant. The MTP has a rated capacity of 180 million gallons per day (MGD), the average daily flow for 1989 was 171.36 mgd. The Main plant does not presently have sufficient operational reserve capacity, or "firm capacity", to provide for occasions when equipment is out of service for maintenance.

The Main plant can handle peak flows beyond the 180 mgd capacity for a short duration, but plant facilities must be upgraded, and expanded to continue to meet Provincial guidelines for effluent discharges and to handle future flows from development and re-development in the Don River Sewershed. In addition, Combined Sewer Overflows (CSO) occur in the Don Sewershed and contain high fecal coliform counts which affect the quality of receiving waters and can cause beach closures. While remedial action is possible through treatment of CSO, the MTP does not have extra capacity and expanding the MTP capacity in order to treat CSO flows would require an Environmental Assessment and potential land reclamation. Most CSO control proposals in recent years have called for retaining the CSO during storm events and transmitting to the Main plant after storm peak flows have been treated.

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The present outfall has a capacity of approximately 250 mgd, when flows exceed this capacity, seawall gates at the shoreline are used to discharge wastewater. This near-shore discharge can result in poor dispersion of effluent in the receiving waters. A new outfall diffuser pipe has been designed and is scheduled for construction in 1993. The expanded and relocated outfall will eliminate the need for emergency release of effluent at the seawall gates and provide better dispersion of effluent to Lake Ontario. Discharge will, therefore, have less adverse impact on receiving water quality.

All secondary treatment effluent from the Main Plant is disinfected with chlorine in order to control bacteria levels. Occasionally, under storm conditions, primary treatment effluent above the capacity of the secondary treatment facility, is by-passed to Lake Ontario after chlorination. While the chlorination process is effective at killing bacteria, too much chlorine in receiving waters can have an adverse impact on fisheries.

All plant processes are regularly monitored as part of the effort to keep effluent and air emissions in accordance with Ministry of the Environment guidelines. The most recent compliance information of the Main STP indicates that it complied with effluent criteria for biological oxygen demand (BOD), suspended solids (SS) and Total Phosphorus (TP). Compliance information for 1989 is summarized below:

Parameter	Annual Ave. Concentration	Monthly Conc. Range	Compliance Basis	Number Exceedences
BOD	14.9	9.0-23.0	annual	-
SS	15.8	9.0-27.0	annual	-
TP	0.6	0.5-0.8	monthly	-

Compliance Criteria: BOD: 25.0 mg/l, annually; SS: 25.0 mg/l, annually; TP: 1.0 mg/l, monthly.

Approximately 10,800 cubic meters of secondary bypass was reported in 1989. The Design capacity of the Main STP is approximately 818,000 cubic meters per day.

### Existing Programs

Metro Toronto maintains a continuous five year capital works plan which allocates projected funding for specified projects. Metro also identifies projects and anticipated costs over longer periods in order to anticipate future needs. The following projects are contained in the current five year plan which is an indication of Metro's intention to proceed with them. Actual construction of works is subject to budget approvals in future years.

The projects listed below have been organized under headings to relate the project to the reason for its initiation. The headings used are selected to give an idea of where a particular

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project fits in. The headings are not used by Metro and classification according to them has been somewhat arbitrary, as many projects involve a number of purposes.

### Actions to Maintain or Improve Plant Efficiency and Reduce Impacts on the Receiver

\* Upgrade of digestion tanks equipment will result in improved processing of sludge making a more efficient sewage treatment process causing less adverse impact on receiving waters and landfill capacity.

CWP # 6.01, 6.02

CAPITAL COST: 1990 - 430,000

\* Sludge storage and transfer to allow for temporary disposal of Humber sludge until permanent facilities are installed and all Humber sludge can be digested resulting in better ability to meet M.O.E. guidelines for effluent and less total load to receiving waters.

CWP # 8.07

CAPITAL COST:	1989 - 525,000	O & M COSTS:	1990 - 143,110
	1990 - 3,082,000		1991 - 146,000

\* Auxiliary systems building to improve incineration process and ash handling resulting in more efficiency and less atmospheric deposition.

CWP # 9.04

CAPITAL COSTS:	1989 - 12,070,000	O & M COSTS:	1989 - 85,284
			1990 - 170,568

\* Sludge incinerators and incineration process improvements to increase ability to efficiently handle sludge and ash generated from Main and Humber with less adverse impact on landfill capacity and atmosphere.

CWP # 9.03, 9.05, 9.06

CAPITAL COSTS:	1989 - 866,000	O & M COSTS:	1990 - 79,285
	1990 - 474,000		1991 - 68,570
	1991 - 1,382,000		
	1992 - 521,000		
	1993 - 547,000		
	1994 - 702,000		
	1995 - 729,000		

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\* New outfall to eliminate seawall discharge and improve effluent dispersion.

CWP # 10.01, 10.02, 10.03

CAPITAL COST:	1992 - 1,702,000
	1993 - 22,974,000
	1994 - 43,637,000
	1995 - 18,840,000

To Provide Additional Plant Capacity for Operational Reserve or Storm Flows

\*Addition to grit removal system will reduce amount of sand and grit in digesters, increase ability to handle storm flows resulting in less untreated stormwater overflow and less bacterial contamination of Lake Ontario.

CWP # 2.04

CAPITAL COSTS:	1990 - 551,000	O & M COST:	1991 - 63,955
	1991 - 6,357,000		1992 - 127,910
	1992 - 8,659,000		

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\* Upgrade of secondary treatment (2 aeration tanks) to allow for 2 tanks to be out of service of tanks due to cleaning or repair (provide firm capacity), gallery ventilation.

CWP # 3.03 , 3.04, 3.05, 3.07

CAPITAL COSTS:	1989 - 1,956,000	O & M COST:	1991 - 94,738
	1990 - 14,066,000		
	1991 - 24,275,000		
	1992 - 14,400,000		
	1993 - 3,254,000		
	1994- 3,600,000		

\*Lakefill , Stage 1, to accommodate additional digesters.

CWP # 14.01

CAPITAL COSTS:	1993 - 333,000
	1994 - 2,808,000
	1995 - 4,739,000

### To Provide Additional Capacity for New Development or Redevelopment

\* Lakefill to accommodate new digesters as the initial step to handling all sludges captured from Main and Humber ultimately facilitating treatment of future flows and reduction in total load to receivers.

CWP # 6.04

CAPITAL COSTS:	1989 - 32,000
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\* digesters (13 - 16) to handle all present sludge from Main and Humber ultimately reducing total load to receivers, gas control building.

CWP # 6.06

CAPITAL COSTS:	1989 - 6,635,000	O & M COST:	1991 - 104,227
	1990 - 16,893,000		1992 - 148,395
	1991 - 18,050,000		

\* Increase ash handling capacity to alleviate present operational difficulties and for future requirements.

CWP # 9.09

CAPITAL COSTS:	1989 - 26,000	O & M COST:	1990 - 61,052
	1995 - 563,000		1991 - 192,104
	1996 - 6,219,000		
	1997 - 6,219,000		

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### To Meet Regulatory Requirements

\* Ventilation of primary tanks and dewatering building to create better working conditions and meet Ministry of Labour (M.O.L.) guidelines.

#### CWP # 2.01

CAPITAL COSTS:	1989 - 5,336,000	O & M COST:	1989 - 88,168
	1990 - 1,776,000		1990 - 66,336

\* Ventilation of primary tanks room to better working conditions and increase longevity of the structure and meet M.O.L. regulatory guidelines.

#### CWP # 2.02, 2.03, 2.05

CAPITAL COSTS:	1989 -3,145,000	O & M COST:	1990 - 69,806
	1990 -9,942,000		1991 - 139,510
	1991 -4,975,000		1992 - 126,285
			1993 - 68,570

\* Chlorine security improvements to reduce risk of accidental release of chlorine to the environment and meet regulatory guidelines.

#### CWP # 5.01

CAPITAL COSTS:	1989 - 368,000	O & M COST:	1990 - 61,184
	1990 - 761,000		1991 - 40,000
	1991 - 3,553,000		1992 - 62,368

\* Nitric acid modifications for safety improvements and meet M.O.L. requirements.

#### CWP # 7.02

CAPITAL COSTS:	1989 - 1,094,000
	1990 - 425,000

\* Improve sludge decant equipment to improve working conditions, meet MOE guidelines for stack emissions for hydrocarbons and resulting in less adverse impact on the atmosphere.

#### CWP # 7.03 - 7.06

CAPITAL COSTS:	1989 - 1,345,000
	1990 - 63,000

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\* Sludge dewatering upgrade and polymer system upgrade, to increase ability to handle sludge at maximum efficiency resulting in fewer odour problems for workers and area residents, better ability to meet solids disposal and M.O.E. effluent requirements.

CWP # 8.03, 8.04, 8.08

CAPITAL COSTS:	1989 - 6,087,000	O & M COST:	1989 - 15,000
	1990 - 7,517,000		1990 - 30,000
	1991 - 12,075,000		1992 - 120,606
	1992 - 20,398,000		1993 - 381,211
	1993 - 1,442,000		

\* Dewatering building ventilation to improve work environment and meet M.O.L. guidelines.

CWP # 8.06

CAPITAL COSTS:	1989 - 189,000	O & M COST:	1989 - 25,000
	1990 - 93,000		

\* Best available technology modifications (venturi scrubbers) for sludge incineration to meet present and future requirements for particulate and hydrocarbon emissions to the atmosphere and ability to meet M.O.E. guidelines.

CWP # 9.10

CAPITAL COSTS:	1989 - 55,000
	1990 - 1,268,000
	1991 - 1,268,000
	1992 - 1,268,000
	1993 - 1,268,000
	1994 - 1,268,000
	1995 - 1,237,000

\* Outline requirements for plant lab expansion necessary for growth and demands, construct necessary facilities to meet future MISA requirements.

CWP # 13.09 , 13.10

CAPITAL COSTS:	1989 - 32,000	O & M COST:	1989 - 27,423
	1990 - 152,000		1990 - 54,846
	1991 - 433,000		1992 - 54,846

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### Actions to Conserve Energy, Provide Worker Safety, and Other Factors

- \* Better working conditions in pumping stations.

CWP # 1.01, .02

CAPITAL COSTS:	1989 - 138,000	O & M COST:	1989 - 10,000
	1990 - 719,000		1990 - 85,067
			1991 - 60,067

- \* Provide means for consuming digester gas generated by incineration process resulting in better safety on site and decreased fuel costs.

CWP # 6.03

CAPITAL COST: 1988 - 382,000

- \* Upgrade sludge cake transfer to improve work environment.

CWP # 8.01, 8.02

CAPITAL COST:	1989 - 1,783,000	O & M COST:	1989 - 61,184
	1990 - 340,000		1990 - 147,368
	1991 - 131,000		1991 - 30,000

- \* Improvements to waste heat recovery building for better economy and work accessibility/safety.

CWP # 9.01, 9.02

CAPITAL COST: 1989 - 356,000

- \* Provide adequate water supply to economize, use less potable water, and improve distribution,.

CWP # 11.02, .03, .04

CAPITAL COST: 1989 - 7,366,000

- \* Improve water system to meet fire marshall guidelines.

CWP # 11.05 , 11.06

CAPITAL COST: 1989 - 767,000  
1990 - 732,000  
1991 - 780,000

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\* Closed loop cooling to economize water consumption and energy input.

CWP # 11.07

CAPITAL COSTS:	1990 - 443,000	O & M COST:	1991 - 45,000
	1991 - 818,000		

\* Service increased power demand and increase safety through modified electrical and supervisory systems.

CWP 12.01 - 12.05

CAPITAL COST:	1989 - 7,801,000	O & M COST:	1989 - 84,637
	1990 - 1,623,000		1990 - 79,274
	1991 - 4,259,000		1991 - 108,228
	1992 - 1,331,000		1992 - 42,771
	1993 - 1,337,000		1993 - 85,542
	1994 - 895,000		1994 - 30,000
			1995 - 40,000

\* Flow metering to keep more accurate records of the plant flows.

CWP # 12.06

CAPITAL COST: 1989 - 32,000

\* Personnel facilities for improved working conditions.

CWP # 13.01, .02

CAPITAL COST:	1989 - 4,237,000	O & M COST:	1989 - 165,340
			1990 - 80,679

\* Lighting, security and paging improvements for more effective communications within the plant in the future.

CWP # 13.04, -.08

CAPITAL COST:	1989 - 1,275,000
	1990 - 930,000
	1991 - 462,000
	1992 - 162,000
	1993 - 207,000

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\*Warehouse facility for on-site storage of equipment.

CWP # 13.03

### CAPITAL COST:

1992 - 373,000

1993 - 5,360,000

1994 - 2,029,000

A summary of the projected spending between 1989 and 1993, for the Main STP is provided below, according to the project purpose.

### Projected Spending at Main STP 1989-93 (Less O & M and equipment) (\$ Millions)

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>Total</u>
Efficiency/ Receiver Impacts	13.461	3.986	1.382	2.223	23.521	44.6
Capacity (reserve)	1.956	14.617	30.632	23.059	3.587	73.9
Capacity (development)	6.694	16.893	18.050	0.	0	41.6
Regulatory Requirements	17.651	21.997	22.304	21.666	2.710	86.4
Other	23.755	4.787	6.45	1.866	6.904	43.8
Total	63.516	62.280	78.818	48.814	36.722	290.3

### Potential Program Improvements

In addition to the projects identified in five year work plan, Metro has identified funds beyond 1993 required to complete projects initiated and additional funds to complete projects which are anticipated as a result of projected regulation and policy changes, and further increases in demand. The projects outlined below are viewed as potential improvements, but it should be recognized that the decision to undertake them will be based on future requirements and needs.

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### Future Capacity Additions for New Development, Redevelopment, or CSO/Stormwater

\* Expansions to scum treatment will continue ability to meet effluent guidelines for future increased flows and reduce phosphorous loads to Lake Ontario.

CWP # 2.05  
CAPITAL COST: 16,910,000

\* lakefill to accommodate facilities, sludge facilities (digesters 13 - 16) and ash handling facilities necessary to treat increased future flow volumes.

CWP # 3.01, .02  
CAPITAL COST: 7,909,000

\* Chlorine expansion to meet future needs.

CWP # 5.02  
CAPITAL COSTS: 18,535,000

\* Expansion of secondary treatment in order to treat future increased flows and /or stormwater flows.

CWP # 3.06  
CAPITAL COST: 325,040,000

\* Sludge dewatering facilities expansion in order to meet ultimate solids disposal requirements (other processes being put in place 1990-93 require that this project go forward).

CWP # 8.05  
CAPITAL COSTS: 1994 to 1999 - 56,144,000

### Future Programs to Meet Regulatory Requirements

\* Tertiary treatment to reduce loads of heavy metals and organics to receiving waters and meet MISA requirements.

CWP # 4.0  
CAPITAL COSTS: 473,764,000

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\* Anaerobic digesters expansion in order to handle all sludges from increased future flows and continue to meet M.O.E. and M.O.L. requirements.

CWP # 6.07

CAPITAL COST: 94,699,000

\* Incinerator and waste handling building expansion in order to handle sludge generated from future flows and continue to meet M.O.E. guidelines.

CWP # 9.07

CAPITAL COST: 28,734,000

\* Fume incinerator and sludge incinerator modifications to meet MOE requirements and reduce particulate and hydrocarbon emissions to the environment.

CWP # 9.08

CAPITAL COST: 7,209,000

\* Land reclamation necessary for future treatment facilities

CWP # 14.0

CAPITAL COST: 8,688,000  
(1995-1998)

### ESTIMATED CAPITAL COSTS

424,538,000 future- capacity  
613,094,000 future- regulatory

1,037,632,000 total

54,939,000 1994 Balance to complete  
26,108,000 1995  
6,219,000 1996  
6,219,000 1997

93,485,000 total to complete

**1,131,117,000 Grand total**

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### Program Benefits

Main treatment plant planned programs and expansions will accommodate treatment of an increased total volume of wastewater. Increased capacity could facilitate treatment of combined sewer overflow and stormwater flows resulting in less discharge from sewer systems and contamination of the receiving waters of lake Ontario. In addition, needed capacity will be in place at the Main Plant should a decision be made to retire North Toronto Treatment Plant and channel NTTP wastewater for treatment at Main Plant.

It is anticipated that the primary means of reduction of toxics will be accomplished through "control at source programs", initiated as a result of the MISA Sewer Use Control programs.

The relocated outfall diffuser pipe will alleviate the problem of release of treated effluent at the seawall gates which currently results in poor dispersion under certain conditions. In addition, it will allow for the discharge of the larger volume of final effluent, generated as a result of increase sewer and plant capacity .

### Dependent Projects

Virtually all of the projects listed in the existing programs are related and therefore dependent. Certain initiatives however either depend on other component actions or will govern the ability to implement other actions. The following major project dependencies are considered to be important when considering the various component actions.

\* Land reclamation (lakefill) will have to take place in order to make space available for additional treatment capacity through new digesters, accommodate additional tanks for tertiary treatment if required by MISA, handle additional stormwater and/or retained combined sewer flows, or retire the North Toronto treatment plant. All of these actions therefore are potentially dependent upon the final decision regarding lakefill policy. If a policy with restrictions on filling were to be selected, and no exemption permitted, the expansion of the Main STP will not be possible. This would curtail the ability to implement many of the options contained in the following component actions:

- 1.1.1 Eastern Beaches Tanks
- 2.1.4 North Toronto STP
- 2.2.1 CSO Policy and Control

In addition it would reduce the feasibility of proposed trunk sewer projects such as the Black Creek Relief Trunk Sewer and the Don/Massey Creek/Coxwell Trunk Relief Sewer. These trunk sewer projects could correct existing deficiencies, and provide faster remediation of many of the combined sewer overflows on the Don and Humber Rivers and other tributary watercourses than would be possible through end-of-pipe retention. These two projects would

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also provide for more flow from development and re-development. These two projects are currently beginning the municipal class environmental assessment process and have the following preliminary costs associated with them:

### Black Creek Trunk Relief

environmental assessment	\$ 90,000
prelim engineering/ geo-tech	270,000

### Don Trunk Relief

environmental assessment	\$ 100,000
prelim engineering and geo-tech	\$ 400,000

\* Plant expansion of secondary tanks and sludge dewatering facilities must occur in order to handle additional flows. Present major constraint to potential acceleration of expansion to handle additional flows is funding.

\* Should the MISA Program require tertiary treatment, additional tanks will be required.

\* The performance of the Humber STP is also dependent upon certain projects contained in the Main STP program. Currently, half of the digested sludge from the Humber Plant is pumped to the Main Plant through the Mid-toronto Interceptor, the remainder is trucked to the Brock West landfill site. This landfill site is close to capacity and will not accept sewage sludge after August of 1990. It is planned to have interim sludge handling facilities at the MTP completed by June of 1990. Permanent sludge facilities to handle all Humber sludge at the Main Plant are under design with construction scheduled to start in 1990.

\* Laboratory facilities and monitoring programs will need to be expanded in order to implement the MISA programs.

### Monitoring Requirements

Monitoring of effluent discharge will be specified by MISA regulation and or receiving water requirements as specified by the RAP.

### Reporting Requirements

Municipal STPs are currently required to report monthly to MOE on the quality of their effluent. Reporting requirements will be expanded under MISA. In addition, status reports are provided regularly to Metro Council, Reports could also be provided to the RAP.

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### Implementation

The key factor in ensuring implementation of projects is continued funding. Sources of revenue for Metro Water Pollution Control are arrived at in the following way:

Implementation of projects in each year is subject to budget approval by Metro Council. In 1989 the Metro Water Pollution Control capital works program projected the need for a gross expenditure of \$103 million. This expenditure was to be broken down as:

Provincial Subsidies (assumed):	\$ 30 million
Federal Grants:	\$ 0
External Sources:	\$ 0.35 million
Reserve Fund:	\$ 40 million
Net Expenditure(after reserves)	\$ 33 million

The assumed provincial subsidy of 33% represents the maximum that Environment Ontario provides for pollution control projects, except in the case of specifically enhanced programs such as WWQIP (see Component Action # 1.3.1). Typically the level of provincial subsidy will vary between 15 and 33%, depending on the project. Whether any project receives funding from the province in a particular year depends on the availability of resources on a province-wide basis. No mechanism exists for assured long-term funding.

The Metropolitan Toronto Corporation establishes corporate net capital expenditure targets or caps on programs in the Corporate 10 year Financial Forecast. Metro considers the following Debt Management Criteria in establishing these capital expenditure targets :

1. The debt charges should not average more than 15% of the levy
2. The percentage of net capital expenditure to be raised annually from the levy should be no more than 50 per cent of the financing required
3. The mill rate should increase each year by no more than the estimated inflation rate within the economy as measured by the Consumer Price Index in the absence of significant expansion of existing programs or the introduction of new programs.

In 1989, the need to meet the corporate target on the program expenditures as capped by the 10 year financial forecast called for use of the entire WPCMRP, even though it was originally intended to use the Fund over a 5 year period. The Treasurer advised use of the WPCMRP first and then a possible institution of a "capital", or a "super" surcharge for 1990 and beyond which would fund capital projects, in part or in whole, in a pay-as-you-go-fashion.

The present means of generating revenue for WPC is through a combination of taxation and a user pay system. User pay revenues predominate with a small residual remaining to be

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generated from the general tax levy. In 1989 a sewer surcharge on the water rate of 168% provides the user pay sewer surcharge revenue. In 1989 this surcharge translates to a rate of \$0.2330 (23.3 cents) per cubic meter. At the time the 1989 sewer surcharge rate was set, it was anticipated that this surcharge revenue together with other miscellaneous revenue sources would fund approximately 95% of all WPC operating expenditures leaving a 5% balance to be funded by taxation. The plan is to make Water Pollution Control operation totally self-sustaining in 1990. This means that all operating expenses of Water Pollution Control would be offset by means of user pay sewer surcharge and other miscellaneous revenues with no requirement for funding from the tax levy. Sewer surcharge rates were increased 16% in 1989, as a step toward recouping all operating costs by the 1990 target date. It is significant to note that a major portion of WPC operating expenditures are capital financing expenses - Capital from Current charges and Debt Financing expenses. These capital financing expenses increase as the capital expenditure program expands.

The possibility of a "rate strategy" (regular increases in rate structures and surcharges) could be investigated. The present system is purely a cost-driven system that goes up and down, and while it reflects reality, it does NOT offer stability or moderately rising costs from year to year. Consideration of a rate stabilization fund as part of the rate strategy would remove the year to year fluctuations; while this may require a legislative change, it is worth investigating. The current process of funding directly from the user base perhaps minimizes political fallout but requires handling in an ad hoc or at best one-year-at-a-time and is not conducive to long-range planning purposes. In contrast, a successful RAP is most likely to be based on a **long-range** planning process, including a long-range fiscal planning component.

### Potential Delays

Major municipal works projects are subject to Municipal Class Environmental Assessment for Sewage and Water Projects. Depending on the potential extent of impact, the project may be evaluated under Schedule A, B, or C of the Class EA. Public notification and consultation are required in the Class EA procedure. The public may request that the Class EA be bumped-up to individual EA status if it is felt that the proponent is not adequately addressing all the environmental concerns.

Many of the proposed works for the Main STP which relate to expansion of capacity will require lakefilling. The concerns regarding lakefilling in the Metro Toronto area are such that requests for bump-up may be anticipated. If such a request is granted it would require preparation of a full Environmental Assessment and approval under the Act. This could potentially lead to substantial delays in project initiation or cancellation of the project.

Metro Works, Water Pollution Control Division, is proceeding with the Municipal Class Environmental Assessment Process (MCEA) process in order to secure approvals for necessary improvements to the Main Treatment Plant as outlined in the 1990 Master Plan.

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The study design is available and the process is scheduled for completion in December of 1990.

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### Summary Information for Implementation

Component Action:	Main STP Improvements
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Lakefilling Policy CSO Policy North Toronto STP Eastern Beaches Tanks Black Creek Trunk Relief Sewer Don/Massey Crk/Coxwell Relief Sewer
Implementation Responsibility:	Metro
Funding Responsibility:	Metro/Province
Estimated Costs:	1989 - 63.5 million 1990 - 62.3 million 1991 - 78.8 million 1992 - 48.8 million 1993 - 36.7 million 1994 - 55.6 million 1995 - 26.1 million Beyond 1995 - \$ 1.1 Billion
Monitoring Requirements	MISA & RAP
Reporting Requirements:	Existing/MISA/RAP
Timeframe:	Ongoing
Potential for Delay	high
Potential Reasons for Delay	Funding, Environmental Assessment

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### Reference Documents

Unpublished correspondence provided by Metro Toronto Water Pollution Control Division,  
Capital Works Report, 1990 - 1994

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### COMPONENT ACTION # 2.1.2:

### Humber Treatment Plant Improvements

The Humber Treatment Plant is located at the mouth of the Humber River and serves the boroughs of Etobicoke, York, and a small portion of North York and the City of Toronto. The plant was put into operation in 1960 and has a total capacity of 90 million gallons a day. Average daily flows were 88.62 mgd in 1989. Planned expansion of the facilities will give the plant ability to treat average flows of 116 mgd by 1994. The planned expansions and upgrades will also provide the ability to handle a larger volume of retained stormwater and increased flows from development or re-development. All plant processes are constantly reviewed to maintain effluent parameters are in accordance with Ministry of the Environment guidelines.

In order to handle future flows from development and re-development in the Humber Sewershed, the plant will require additional operational reserve capacities to allow for repair or maintenance of existing equipment. In addition, an expanded daily flow capacity is planned in order to continue to meet Provincial guidelines for effluent.

There is an ongoing problem with Combined Sewer Overflows in the Humber Sewershed. The present plant capacity will have to be expanded before the plant can treat CSO, stormwater from detention tanks or additional flow from increased sewer capacity channelling into the plant. Increasing the Humber plant capacity in order to treat flows beyond 116 mgd would require Environmental Assessment.

A new plant outfall extension is planned to allow for better dispersion of effluent in Humber Bay and Lake Ontario, reducing impacts on these receiving waters.

There are no incineration facilities at Humber Treatment Plant. Currently half the digested sludge is pumped to the Main plant through the Mid Toronto Interceptor (about 1,250 cubic metres per day) and the remainder is transferred to the Brock West landfill site via truck after dewatering at Legion Road. The landfill site is close to capacity and will not accept sewage sludge after August of 1990, it is then planned to transfer all sludges to the Main Plant where permanent facilities are under design.

The most recent compliance information of the Humber STP indicates that it complied with effluent criteria for biological oxygen demand (BOD), suspended solids (SS) and Total Phosphorus (TP). Compliance information for 1989 is summarized below:

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Parameter	Annual Ave. Concentration	Monthly Conc. Range	Compliance Basis	Number Exceedences
BOD	7.4	4.1-12.1	annual	-
SS	18.1	10.9-21.3	annual	-
TP	0.7	0.6-0.9	monthly	-

Compliance Criteria: BOD: 25.0 mg/l, annually; SS: 25.0 mg/l, annually; TP: 1.0 mg/l, monthly.

A total volume of approximately 49,000 cubic meters of secondary bypass was reported for 1989. The design capacity of the Humber STP is 409,000 cubic meters per day.

### Existing Programs

Metro Toronto maintains a continuous five year capital works plan which allocates projected funding for specified projects. Metro also identifies projects and anticipated costs over longer periods in order to anticipate future needs. The following projects are contained in the current five year plan which is an indication of Metro's intention to proceed with them. Actual construction of works is subject to budget approvals in future years.

The projects listed below have been organized under headings to relate the project to the reason for its initiation. The headings used are selected to give the non-technical an idea of where a particular project fits in. The headings are not used by Metro and classification according to them has been somewhat arbitrary, as many projects involve a number of purposes.

### Actions to Maintain or Improve Plant Efficiency and Reduce Impacts on the Receiver

\* Sludge digesters to provide capacity, result in fewer odours and easier dewatering improving plant efficiency.

CWP # 6.01, 6.02

CAPITAL COSTS:	1989 - 3,150,000	O & M COSTS:	1990 - 74,227
	1990 - 12,827,000		1991 - 148,455
	1991 - 3,004,000		
	1992 - 3,252,000		

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\* Plant outfall extension to provide better dispersement of effluent to reduce adverse impacts on receiving waters.

CWP # 10.01, 10.02

CAPITAL COST: 1991 - 255,000  
1992 - 128,000  
1993 - 3,829,000  
1994 - 3,829,000  
1995 - 3,446,000

\* Gas generator building, electrical and supervisory system to provide emergency power for pumping station in event of storm or power failure improving safety and reducing overflow of untreated wastewater to receiving waters.

CWP # 12.01 - 12.05

CAPITAL COST: 1992 - 122,000  
1993 - 443,000  
1994 - 1,274,000  
1995 - 12,483,000

Provide Additional Capacity for Operational Reserve or to Retain Combined or Storm Flow

\* Additional primary tank to handle larger volume of storm flow resulting in less bacterial contamination of receiving waters.

CWP # 2.01

CAPITAL COST:	1991 - 425,000	O & M COST:	1993 - 71,184
	1992 - 4,558,000		1994 - 119,368
	1993 - 4,254,000		

Secondary treatment upgrade to increase ability to treat increased flows and reduce total load to receiving waters.

CWP 3.01, 3.02

CAPITAL COST:	1989 - 8,105,000	O & M COST:	1990 - 64,319
	1990 - 3,983,000		1991 - 98,637
	1994 - 3,350,000		
	1995-98 - 48,243,000		

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### Other Actions

Administration, hygiene and lunchroom facilities to provide better working conditions.

CWP # 13.01, 13.02,

CAPITAL COST:	1989 - 1,407,000	O & M COST:	1990 - 34,554
	1990 - 2,800,000		1991 - 59,107
	1991 - 2,750,000		

A summary of the projected capital works spending between 1989 and 1993, for the Humber STP is provided below, according to the project purpose. Operations and Maintenance costs and cost of equipment replacement are not included in these totals.

#### Projected Capital Works Spending at Humber STP 1989-93

	(\$ Millions)					
	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>Total</u>
Efficiency/ Receiver Impacts	3.150	12.827	3.259	3.502	4.084	26.8
Capacity (reserve/CSO)	8.105	3.983	0.425	4.558	4.325	21.4
Other	1.407	2.800	2.750	0	0	7.0
Total	12.662	19.610	6.434	8.060	8.409	55.2

### Potential Program Improvements

In addition to the projects identified in five year work plan, Metro has identified funds required to complete projects initiated and additional funds to complete projects which are anticipated as a result of projected regulation and policy changes, and further increases in demand. The projects outlined below are viewed as potential improvements, but it should be recognized that the decision to undertake them will be based on the results of studies which are either under way or needed in the future. Each of the projects would be undertaken for the purposes of meeting regulatory requirements, if required.

\* Waste activated sludge system improvements to meet M.O.E. requirements.

CWP # 3.04

CAPITAL COST: 1994-98 - 2,365,000

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\* Tertiary treatment for ability to meet MISA guidelines and anticipated M.O.E. requirements.

CWP # 4.01

CAPITAL COST: 88,938,000

The total funding to complete projects beyond the current five year work plan, combined are outlined below:

1994 - 15,532,000

1995 - 33,502,000

1996 - 16,813,000

1997 - 16,081,000

\$ 88,938,000 ( future tertiary )

170,866,000 Total

### Program Benefits

Humber plant expansions and upgrades will provide the capacity necessary to accept additional flows from development and re-development and storms, reducing bacterial contamination and subsequent beach closures.

The plant outfall extension will improve dispersion, reducing impacts on receiving waters. In conjunction with source controls instituted as a result of MISA, this should produce a significant improvement in the receiving water.

The centrifuge installation at Legion Road is a temporary improvement to dewatering sludge until the Main Plant can receive all sludges via the Mid Toronto Interceptor.

### Dependent projects

A new sewer in the Black Creek drainage area (Humber sewershed) is being planned to better manage wet weather flows, including reduce combined sewer overflows and alleviate basement flooding. (see 2.1.1, MTP) In addition to these RAP concerns, it will also provide more capacity in the system to accommodate sanitary flows from proposed development and re-development. This project will ultimately reduce adverse impacts on aquatic habitats in receiving waters. The Black Creek Trunk Relief sewer is planned to allow for an increased flow volume to the Humber Treatment plant due to increased population forecasts, which will ultimately require expansion of the plant beyond existing rated capacity. At this point it is difficult to cost what portion of the costs would be applicable to remedial actions and what portion for future development and population.

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Environmental assessment will be required to expand rated plant capacity, projects dependent on this increased capacity are the new sewer, and abilities to treat additional flow or stormwater flow from detention facilities.

### Monitoring Requirements

See Component Action 2.1.1, Main STP Improvements.

### Reporting Requirements

See Component Action 2.1.1, Main STP Improvements.

### Implementation

See also Component Action 2.1.1, Main STP Improvements.

### Potential Delays

The potential for delays in project implementation at the Humber STP are similar to those indicated for the Main STP (Component Action 2.1.1). Funding and approval delays associated with Environmental Assessment are of greatest concern. No lakefilling is required for Humber STP projects.

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### Summary Information for Implementation

Component Action:	Humber STP Improvements
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	CSO Policy Black Creek Trunk Relief Sewer
Implementation Responsibility:	Metro
Funding Responsibility:	Metro/Province
Estimated Costs Range:	1989 - 12.6 million 1990 - 19.6 million 1991 - 6.4 million 1992 - 8.1 million 1993 - 8.4 million 1994 - 15.5 million 1995 - 33.5 million Beyond 1995 - \$ 122 million
Monitoring Requirements	MISA & RAP
Reporting Requirements:	Existing/MISA/RAP
Timeframe:	Ongoing
Potential for Delay	high
Potential Reasons for Delay	Funding Environmental Assessment

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### Reference Documents

Unpublished correspondence provided by Metro Toronto Water Pollution Control Division

### COMPONENT ACTION # 2.1.3:      Highland Creek Treatment Plant Improvements

Highland Creek Treatment Plant is currently rated for flows of 48 MGD, average daily flows in 1988 were 35.5 MGD, average daily flow for 1989 was 39.5 MGD. While flows are less than rated plant capacity population projections and flow data suggest expansion of the plant will be necessary by 1994 to ensure "firm capacity". All Plant processes are constantly reviewed to maintain effluent parameters are in accordance with Ministry of Environment guidelines.

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The most recent compliance information of the Highland Creek STP indicates that it complied with effluent criteria for biological oxygen demand (BOD), suspended solids (SS) and Total Phosphorus (TP). Compliance information for 1988 is summarized below:

Parameter	Annual Ave. Concentration	Monthly Conc. Range	Compliance Basis	Number Exceedences
BOD	7.5	4.7-11.7	annual	-
SS	22.7	17.5-27.8	annual	-
TP	0.7	0.6-1.0	monthly	-

Compliance Criteria: BOD: 25.0 mg/l, annually; SS: 25.0 mg/l, annually; TP: 1.0 mg/l, monthly.

It was further reported that no sewage volume was bypassed during 1988.

### Existing Programs

Metro Toronto maintains a continuous five year capital works plan which allocates projected funding for specified projects. Metro also identifies projects and anticipated costs over longer periods in order to anticipate future needs. The following projects are contained in the current five year plan which is an indication of Metro's intention to proceed with them. Actual construction of works is subject to budget approvals in future years.

The projects listed below have been organized under headings to relate the project to the reason for its initiation. The headings used are selected to give the non-technical an idea of where a particular project fits in. The headings are not used by Metro and classification according to them has been somewhat arbitrary, as many projects involve a number of purposes.

### Actions to Maintain or Improve Plant Efficiency

- \* Primary sludge pumping for increased plant efficiency

CWP # 2.03

CAPITAL COST: 1991 - 460,000

### Actions to Provide Additional Plant Capacity for Operational Reserve

- \* Grit and screening improvements to reduce load in digesters and establish firm capacity

CWP # 2.01, 2.02

CAPITAL COST: 1991 - 23,000  
1993-95 - 734,000

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\* Primary tanks to meet firm capacity requirements

CWP # 2.03

CAPITAL COST:   1991 - 66,000  
                      1992 - 216,000  
                      1993 - 4,786,000  
                      1994 - 5,743,000  
                      1995 - 4,786,000

\* Aeration and final tanks for firm capacity

CWP # 3.01, 3.02, 3.03

CAPITAL COST:   1989 - 525,000  
                      1990 - 1,050,000  
                      1991 - 1,869,000  
                      1992 - 341,000  
                      1993 - 7,977,000  
                      1994 - 10,051,000  
                      1995 - 8,794,000

\* Chlorine Expansion for firm capacity

CWP # 5.01

CAPITAL COSTS:   1989 - 179,000  
                      1990 - 188,000

\* Sludge dewatering for dryer sludgecake and reduce fuel consumption

CWP # 8.01,.02,.03,.05

CAPITAL COST:	1989 - 1,704,000	O & M COST:	1989 - 40,000
	1990 - 1,582,000		1993 - 40,000
	1991 - 659,000		
	1992 - 1,580,000		
	1993 - 1,764,000		
	1994 - 0		
	1996 - 78,000		
	1997 - 2,095,000		
	1998 - 2,173,000		

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\* Sludge incineration modifications and heat recovery for dewatered sludge and energy savings.

### CWP # 9.01, 9.02

CAPITAL COST:	1989 - 192,000	O & M COST:	1992 - 149,318
	1990 - 1,050,000		1993 - 98,637
	1991 - 4,463,000		
	1992 - 3,868,000		
	1993 - 643,000		
	1994 - 137,000		

### Other Actions

Odour control study and addition

### CWP # 3.04, 3.05

CAPITAL COST:	1989 - 110,000	O & M COST:	1991 - 43,135
	1990 - 536,000		1992 - 36,269
	1991 - 1,050,000		

\* Additional digesters to reduce odour, more economical treatment and replace heat treatment of sludge.

### CWP # 6.01

CAPITAL COST:	1989 - 3,438,000	O & M COST:	1990 - 58,077
	1990 - 8,400,000		1991 - 230,154
	1991 - 8,400,000		1992 - 109,200
	1992 - 4,398,000		1993 - 114,660

\* Electrical and supervisory system for improved plant safety and stand-by power.

### CWP # 12.01 - .06

CAPITAL COST:	1989 - 52,000
	1990 - 55,000
Beyond	1998 - 11,920,000

\* Administration, hygiene and security improvements to improve working conditions

### CWP # 13.01 - .04

CAPITAL COST:	1989 - 1,696,000
	1990 - 2,379,000

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A summary of the projected capital works spending between 1989 and 1993, for the Highland Creek STP is provided below, according to the project purpose. Costs for operations and maintenance and equipment replacement are not included in these totals.

### Projected Capital Works Spending at Highland Creek STP 1989-93

	<u>(\$ Millions)</u>					
	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>Total</u>
Efficiency	0	0	0.460	0	0	0.5
Capacity (reserve)	2.640	3.870	7.080	6.005	15.376	34.9
Other	5.295	10.811	11.334	4.398	0	31.8
Total	7.935	14.681	18.874	10.403	15.376	67.3

### Potential Program Improvements

In addition to the projects identified in five year work plan, Metro has identified funds required to complete projects initiated and additional funds to complete projects which are anticipated as a result of projected regulation and policy changes, and further increases in demand. The projects outlined below are viewed as potential improvements, but it should be recognized that the decision to undertake them will be based on the results of studies which are either under way or needed in the future.

#### Actions to Increase Capacity

- \* Stage 2 Secondary Treatment expansion

CAPITAL COST: Beyond 1998 - 34,260,000

#### Actions Taken to Meet Potential Regulatory Requirements

- \* Tertiary treatment to reduce impact on receiving waters and meet future MISA requirements

CWP # 4.0

CAPITAL COST: Beyond 1998 - 39,812,000

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### Actions to Improve Plant Efficiency

- \* Sludge dewatering for maximum efficiency and reduce fuel consumption

CWP 8.04

CAPITAL COST: Beyond 1994 - 3,135,000

### Other Actions

- \* Additional sludge incineration capacity and heat recovery for increased quantities of dewatered sludge and for energy savings.

CWP # 9.03

CAPITAL COST: Beyond 1998 - 11,425,000

- \* Electrical and Supervisory upgrade

CAPITAL COST: Beyond 1998 - 12,027,000

The total funding to complete projects initiated under the current five year work plan, combined with the projects outlined above yield a potential funding requirement, beyond 1993 as outlined below:

	1994 - 16,601,000	
\$	1995 - 13,582,000	
	1996 - 78,000	
	1997 - 2,095 000	
	1998 - 2,173,000	
	beyond 1998 - 100,659,000 (includes 40 million future tertiary)	
\$	135,188,000	total

### Program Benefits

The main benefits associated with the improvements planned for the Highland Creek STP are those associated with firm capacity. The additional capacity allows proper maintenance to ensure efficient operation, While maintaining the ability to meet peak flows without loss of effluent quality. The Highland Creek has the most free capacity of all of the Metro STPs under current conditions, but this is expected to be largely exhausted by 1994.

As in the case of all STPs the effect of source controls, implemented as a result of MISA are expected to have a positive impact on loading to the plant and hence effluent quality.

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### Dependent Projects

No dependent projects have been identified.

### Monitoring Requirements

See Component Action 2.1.1, Main STP Improvements.

### Reporting Requirements

See Component Action 2.1.1, Main STP Improvements.

### Implementation

See also Component Action 2.1.1, Main STP Improvements.

### Potential Delays

The potential for delays in project implementation at the Highland Creek STP are similar to those indicated for the Main STP (Component Action 2.1.1). Funding and approval delays associated with Environmental Assessment are of greatest concern. No lakefilling is required for Highland Creek STP projects.

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### Summary Information for Implementation

Component Action:	Highland Creek STP Improvements
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	None Identified
Implementation Responsibility:	Metro
Funding Responsibility:	Metro/Province
Additional Costs Range:	1989 - 7.9 million 1990 - 14.6 million 1991 - 18.9 million 1992 - 10.4 million 1993 - 15.5 million 1994 - 16.6 million 1995 - 13.6 million Beyond 1995 - \$ 105 million
Monitoring Requirements	MISA & RAP
Reporting Requirements:	Existing/MISA/RAP
Timeframe:	Ongoing
Potential for Delay	medium
Potential Reasons for Delay	Funding Environmental Assessment

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### Reference Documents

Unpublished correspondence provided by Metro Toronto Water Pollution Control Division

### COMPONENT ACTION # 2.1.4:      North Toronto Treatment Plant Improvements

The North Toronto Treatment Plant was placed on operation in 1928. The plant is located in the Don Valley, serves a population of about 55,000 and employs 22 full-time staff. The plant operates at a controlled uniform rate of 7.5 million gallons per day. The plant provides approximately 25 - 30 per cent of the dry weather flow to the Don River. Sewage in excess

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of the plant capacity is diverted to the North Toronto Trunk Sewer and then conveyed to the Main Plant via Coxwell Sanitary Trunk Sewer.

The most recent compliance information of the North Toronto STP indicates that it complied with effluent criteria for biological oxygen demand (BOD), and suspended solids (SS) and was out of compliance for Total Phosphorus (TP). Compliance information for 1989 is summarized below:

Parameter	Annual Ave. Concentration	Monthly Conc. Range	Compliance Basis	Number Exceedences
BOD	10.9	2.2-23.7	annual	-
SS	14.4	4.6-36.8	annual	-
TP	0.8	0.5-1.4	monthly	2

Compliance Criteria: BOD: 25.0 mg/l, annually; SS: 25.0 mg/l, annually; TP: 1.0 mg/l, monthly.

The recently completed "Strategy for Improvement of the Don River Water Quality" conducted under TAWMS, suggests that removal or upgrading of the North Toronto STP be strongly considered. While the study recognized that the plant only effects the lower river, and that stormwater runoff is the major cause of degradation in the Don, it was determined that the STP contributes significant quantities of copper, lead, phosphorus and ammonia during dry weather. There are concerns for potential toxic conditions in the lower river because of ammonia, chlorine, and heavy metals. The STP is not the only source of these toxics, with the exception of chlorine, but it is a contributory factor. The study emphasizes the need to decide the ultimate use of the STP on an ecosystem basis, considering impacts on sewer systems, effluent quality at the Main STP, water quality in the lake, as well as riverine impacts on water quality and baseflow in the Don.

### Existing Programs

All works currently budgeted for North Toronto STP are to maintain plant efficiency. The majority of funds are spent on equipment replacement. Currently Metro is undertaking a physical audit of NTTP to evaluate the mechanical and structural status of the buildings and plant equipment. Following such an audit, Metro will be able to make a decision about the current/future uses of the facilities at the plant. A decision to upgrade or decommission the plant will be made once all information is evaluated.

The current planned budget for the North Toronto STP is provided below. Projects include upgrading, maintaining and replacing equipment, a structural integrity test and roof replacement of sludge storage building, and an upgrade of aeration tanks.

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CAPITAL COSTS:	1989 - 525,000	1994 - 566,000
	1990 - 331,000	1995 - 594,000
	1991 - 347,000	1996 - 623,000
	1992 - 547,000	1997 - 655,000
	1993 - 539,000	1998 - 687,000

Spending in future years assumes the plant continuing to function on its current design basis. Budget allocations will of course change if a decision is made to upgrade or retire the plant.

### Potential Program Improvements

Discussions regarding the upgrading or retirement of the North Toronto STP have been ongoing for several years. A decision has not been made and it is likely that the final decision will be made on the basis of cost because the technology does exist to achieve an effluent quality which is acceptable to all riverine uses. Recent study results and anticipated future regulatory requirements under MISA tend to suggest retirement of the plant.

If the North Toronto plant was to be taken out of service, planning and design time for alternative means of treatment would have to be considered. Specific considerations:

- \* All the sewage currently treated at the plant will have to be diverted to the Main Treatment Plant. A new sewer from the plant to the Mid-Toronto Interceptor will have to be constructed at an estimated cost \$10 million.
- \* The additional flow at the Main plant will require construction of facilities at an approximate cost of \$40,000,000.
- \* A decision to upgrade the plant rather than retire it would likely lead to the need to provide tertiary treatment to control ammonia and chlorine toxicity. Additional forms of treatment could be required because the plant has for all intents no available mixing zone. Effluent will likely be required to meet Provincial Water Quality Objectives at the end-of-pipe. This option has not been costed. Available land space is also a consideration.

### Program Benefits

Removal of the North Toronto STP discharge will reduce the levels of many contaminants in the lower reaches of the Don River and will eliminate one source of sediment contamination for the Keating Channel. The Don River Strategy report indicated the following reductions in concentrations for different conditions, if the North Toronto STP were to be removed from service.

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		Concentration (mc/l)				
Condition		SS	TP	Parameter		
				AMMONIA	COPPER	LEAD FECAL COL.
Water Quality Target		200	0.10	-	.005	.025 100
Dry Weather	Existing	6	0.43	1.55	.024	.014 2000
	STP Removal	3	0.19	0.01	.011	.001 2000
Wet Weather (5 mm)	Existing	204	0.34	0.53	.030	.113 8000
	STP Removal	203	0.29	0.24	.027	.110 8000
Wet Weather (10 mm)	Existing	224	0.37	0.46	.032	.128 20000
	STP Removal	223	0.35	0.30	.031	.126 20000
Wet Weather (20 mm)	Existing	235	0.37	0.40	.033	.135 22000
	STP Removal	235	0.36	0.32	.032	.134 22000

Note: Water Quality Targets are as used in the Don River Study.

The predicted reductions indicate that removal of the North Toronto STP will have a significant impact in reducing in-stream concentrations of most parameters, in the Lower Don, during dry weather. Plant removal will have a very limited effect on concentration during wet weather runoff events. The effects of removal decrease with increasing storm size, indicating the dominance of storm sewer and CSO discharge on water quality during and after rainfalls.

Since all effluent is chlorinated, the Plant does not contribute to fecal coliform levels in the Don River. Therefore, plant removal will not provide any benefits towards the goals related to "swimmable" waters. Further, it should be recognized that plant removal does not result in achieving the water quality targets in the lower Don even during dry weather. Additional controls, on other sources will be necessary if the targets are to be reached. Without plant removal or upgrading however, it will be impossible to achieve targets during dry weather conditions.

### Dependent Projects

Retiring the North Toronto STP would require provision of new trunk capacity to convey flows to the Main STP. A study has been commissioned to review alternative methods of improving the Don trunk sanitary sewer for the purpose of correcting existing deficiencies, providing more capacity for development and re-development and also identify potential routes to convey NTP flow to the Main TP. The study includes Class Environmental Assessment which is scheduled for completion in 1990.

In addition, treatment capacity requirements at the Main Plant would increase. Since such expansion would require lakefilling, the retirement of the North Toronto plant is dependent on the provincial lakefilling policy which is under development (Component Action # 1.4.2).

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### Monitoring Requirements

No specific monitoring will be required if the plant is removed from service. Monitoring of the river below the plant will be included in the overall RAP monitoring strategy. The plant effluent will be sampled according to the MISA regulations once in effect.

### Reporting

Compliance information on the North Toronto STP is currently collected and published by Environment Ontario annually. This information, as well as progress relating to the plant will be incorporated in the annual RAP report.

### Implementation

Pending a decision to upgrade or decommission; see below Potential Delays.

### Potential Delays

The retirement of the North Toronto plant depends ultimately on the ability to increase capacity at the Main STP. Expansion at the Main plant is also required for a number of other reasons including the desire to treat retained CSO and provide necessary capacity for redevelopment within the Don sewershed. The total cost of the expansion at the Main Plant is over \$ 500 million just for the Don Sewershed needs and neglecting the capacity requirements of the central waterfront CSOs. The substantial outlay will require major commitments by all governments on a continuing basis for many years. If other priorities intervene all projects dependent on the Main plant could be delayed.

To take North Toronto plant out of service, would require construction of a new sewer and the expansion of the Main Treatment Plant which could take between five and ten years to complete after class environmental assessment approval.

The class EA for the existing Main STP master plan is scheduled for 1990, and will be required for STP expansion and construction of trunk sewers. Therefore, the North Toronto program will be dependent upon the speed at which the EA process moves.

The final form of the Provincial lakefill policy may impact the cost or the ability to expand the Main STP.

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### Summary Information for Implementation

Component Action:	North Toronto STP Improvements
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Main STP expansion
Implementation Responsibility:	Metro
Funding Responsibility:	Metro/Province
Additional Costs Range:	\$10 million for Trunk capacity Main STP expansion costs (CA # 2.1.1)
Monitoring Requirements	MISA & RAP
Reporting Requirements:	Existing/MISA/RAP
Timeframe:	5 - 10 years
Potential for Delay	high
Potential Reasons for Delay	Funding, Environmental Assessment Lakefill Policy

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### Reference Documents

1. "Strategy for Improvement of Don River Water Quality", Environment Ontario, September 1989.
2. "Study of Metropolitan Toronto Don Trunk Sewer System and Main Treatment Plant", Draft Report, UMA Engineering Ltd., September 1989

### REMEDIAL ACTION # 2.2:

#### Reduce Sanitary Discharges from Storm Sewer Outfalls and Overflow Points (CSO)

Domestic discharges are typically directed to a sanitary sewer which conveys the waste to a sewage treatment plant (STP). The plants are designed to handle domestic biological wastes and are effective in this regard. Discharge from the STPs to the receiver (lake) do not pose a significant health risk in terms of pathogenic materials.

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A small percentage of domestic wastes do enter the receiver directly and without treatment. These wastes come from illegal residential connections to storm sewers or overflows from combined sewer systems. Concerns regarding combined sewer overflows (CSO) have been prevalent for many years, and major programs of sewer separation have been undertaken in the cities of Toronto, York, East York and Scarborough. Concerns regarding illegal connections have historically received less attention, with most municipalities reacting only to complaints or problems. Under TAWMS, thousands of storm sewer outfalls have been prioritized according to their bacterial load and programs have been undertaken to trace and disconnect improper domestic connections to storm sewers. These programs have not been extended to the Regions within the RAP area outside of Metro.

### COMPONENT ACTION # 2.2.1:

#### Reduce and Virtually Eliminate Combined Sewer Overflows to Receiving Waters

Combined sewer overflows (CSO) occur in the older parts of Metro where a single sewer conveys both sanitary sewage and stormwater. Under dry conditions all flow is conveyed to the water pollution control plants. When it rains, stormwater enters the sewer system, mixes with sanitary sewage and substantially increases flow. The combined sewer system continues to convey all flow to the treatment plants until the sewer capacity is exceeded. The capacity of the system is approximately two and a half times the normal dry weather flow. Beyond this point, excess flow is discharged directly to the rivers or the lake through overflow structures. Where there is an exceedence of local capacity or capacity at the overflow structure, the combined sewage can back up into basements causing flooding. Aside from the damage caused, basement flooding is a health hazard.

Combined sewage is a potent source of bacteria and chemicals because of the residential sewage and industrial wastes contained in it. The quantity and frequency of discharge varies by outfall, but the total discharge is small in comparison to the volume from separate storm sewers. There are 34 CSO which discharge to the lake directly and an additional 35 on the Don and Humber Rivers. The other Metro watersheds do not have CSO.

### Existing Programs

Remedial programs which address CSO have been divided into the following categories: sewer separation; inlet control and infrastructure; and storage.

Sewer separation has been the traditional method of reducing CSO and basement flooding. It entails construction of new road storm sewers which accept drainage from the roads alone. Roof leaders and private drains remain connected to the old combined sewer. Between 1966 and 1983, the City of Toronto spent \$182 million to separate sewers, removing over 8000 hectares from the combined sewer system. Since 1984, when WWQIP was put in place,

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about \$29 million has been spent on an accelerated program of sewer separation in Toronto, York, East York and Scarborough.

Sewer separation has significantly reduced basement flooding and has in some cases lessened the impact of CSO by reducing the frequency and volume of overflows. It has the disadvantage of increasing the amount of wet weather flow discharged through the storm sewers. Alternate methods, such as the use of storage tanks, are usually evaluated in current practice. In some situations however, sewer separation remains the most cost effective and rapid means of alleviating acute basement flooding problems.

Expenditures on sewer separation have declined from the \$8 - 10 million range, which occurred through 1984-86, to about \$5 million in 1987, and \$1.6 million projected for 1988. A corresponding rise in spending on alternate methods, such as inlet control and tanks, has taken place. Provincial funding formulas involving grants from Environment Ontario and the Ministry of Transportation and Communications have been altered to permit the use of alternate methods to sewer separation.

Inlet control involves placing flow restrictors on catchbasin inlets or sealing catchbasins. Stormwater beyond the capacity of the combined sewer system is retained on the street surface or in underground tanks for later discharge to the system. Approximately \$1.6 million was spent under WWQIP for inlet control projects in 1986-87. An additional \$1.5 million has been allocated under the 1988 WWQIP. The inlet control projects have taken place primarily in areas prone to basement flooding.

Another form of inlet control involves disconnection of roof leaders from combined sewers and discharge instead onto lawns where the water can drain into the soil. The success of this type of control has been limited because of legal problems. In general, disconnection of roof leaders in combined sewer areas must be voluntary. York conducted a small scale trial program on an area comprising 300 houses. They received consents from 56 owners and determined that 58 more had already been disconnected for a total disconnection potential of 38%. Typically, owners who have experienced basement flooding are prepared to disconnect, while those who have not, will not give their consent. The 1988 WWQIP program has allocated \$35000 for disconnection of roof leaders in the test area.

Combined sewer overflows can be reduced in volume and frequency by constructing storage tanks at the overflow point, to capture CSO for later treatment at the pollution control plants. There are concerns however, that retained CSO will cause problems with capacity and process effectiveness at the plants. With continually increasing demands for capacity to allow development and the anticipated requirements to meet stricter effluent requirements under MISA, Metro has been reluctant to give permission for storage facilities until studies of the potential impacts are complete. A study of capacity at the Humber Bay STP has been completed recently, and a similar study involving the Main STP is under way.

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Approval of storage tanks in York has been delayed pending completion of the capacity study. Approval of the smaller of two tanks proposed for the eastern beaches required that an extended outfall be incorporated into the design so that if it was ultimately determined that treatment of retained stormwater and CSO was having a detrimental affect on the WPCP, retention for treatment could be discontinued. Although the completion of capacity studies is required prior to deciding to accept CSO, Metro has allocated funds in its five year capital works plan for additional capacity, anticipating the need for some CSO containment.

### Potential Program Improvements

Metro has formulated a draft CSO policy which it intends to present to Council in the near future. The policy would allow Metro to accept retained CSO from detention tanks into its treatment system at specified rates, and fund CSO detention projects for the purposes of water quality improvement.

The proposed policy contains eleven recommendations which are summarized below:

1. Metro will accept combined sewage diverted to the sanitary system consisting of flows which would otherwise overflow from sewer systems at a frequency of more than once per year on the average.
2. Metro will accept all wet weather flow through its treatment system which combined sewage and Inflow/Infiltration (I/I) which would otherwise overflow at a frequency of once per year through the treatment plant bypasses.
3. Area municipalities must investigate and minimize I/I, pass by-laws to regulate I/I, enforce bylaws, and review and report these activities to Metro annually.
4. Where practical all redevelopment must have separated systems, with foundation drain flow directed away from the sanitary systems.
5. Metro will consider approval of detention facilities by area municipalities if further separation is impractical or will cause delay.
6. Metro will require notification five years in advance of construction for detention facilities by area municipalities, in order to plan, design and finance transmission and treatment expansions.
7. Metro will approve detention facilities on local sanitary sewers for excessive I/I control, provided the proposal conforms to the assigned hydrograph at the inlet to the Metro Trunk system.

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8. Metro will approve of all detention tank facilities in regard to the rates at which detained flow is released back into the system.
9. Metro will not fund detention facilities strictly for relief of basement flooding.
10. Subject to enabling legislation, Metro will share the cost of construction of detention facilities to reduce CSO.
11. Metro's cost sharing will be based on a formula, after Provincial and Federal subsidies. For projects which achieve at least 60% control, by volume, Metro will pay 20% of the net cost. For projects which achieve at least 90% control, Metro will pay 25% of the net cost.

The key aspects of this policy are:

- a) Full separation of systems remains Metro's ultimate objective and subject to Council approval, Metro will continue to subsidize sewer separation projects in York and East York at 50% and in Scarborough and Toronto at 25%. This recognizes that additional treatment capacity at the STP's is not required when sewers are separated. All redevelopment will be required to have separated systems, where practical. It is noted that new developments are all constructed on the basis of separated systems.
- b) Recognizing that full separation will take up to 100 years at present redevelopment rates, Metro will encourage detention of existing CSO for later treatment at the STP's. Metro will contribute up to 25% of the cost of the local detention facilities and will provide the necessary additional treatment capacity.
- c) Metro will construct facilities to ensure that plant by-pass occurs no more frequently than once per year on average.
- d) Metro will not fund projects designed solely for the alleviation of basement flooding.

The implementation of this policy would require actions on the sewer systems tributary to the Main and Humber STPs. Projected costs for the policy on each system are provided below.

### **A. Implement CSO Policy on the Humber System**

The Humber system contains five CSO locations on Black Creek and a plant by-pass to the Humber River. Overflow from the plant by-pass occurs infrequently. The Humber River Water Quality Management Plan (Component Action # 4.2.1) recommended that the CSOs be eliminated to a practical extent, reducing overflow frequency to once per year on average, through the construction of detention tanks. Retained CSO was to be returned to the system

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for treatment after dry weather flow conditions resumed. The anticipated cost was \$ 4.7 million capital, plus \$ 31 K annual maintenance (1985 \$). No provision was made for additional treatment plant capacity, nor was provision made for handling additional I/I. Completion of the Humber Sanitary Trunk Sewer and Treatment Plant Study (1988) which was funded under the WWQIP program as part of the implementation of the Humber plan has provided a basis for the following cost estimates.

TOTAL ESTIMATED COST FOR I/I AND CSO CONTROL  
HUMBER SYSTEM (\$ Millions)

<u>Measure</u>	<u>Implementor</u>	<u>Cost</u>	<u>Share</u>		<u>Province*</u>
			<u>Metro</u>	<u>Loc. Mun.</u>	
Detention Black Cr STS	Local, Metro	4.5	1.0	2.0	1.0
Capacity Black Cr STS	Metro	4.3	2.9	0	1.5
Metro CSOs	Metro	32.0	21.3	0	10.7
York CSOs	Local, Metro	19.3	3.2	9.7	6.4
Total		60.1	28.4	11.7	20.0

Note 1: These projects are contingent upon expansion of the Humber STP at an estimated cost of \$65 million. STP costs are not included in totals here to avoid double counting. Refer to Component Action # 2.1.2.

Note 2: The provincial share is based on the maximum contribution of 33%. Provincial sharing typically ranges from 15 to 33%

### **B. Implement CSO Policy on the Don System**

The Don system contains sixty-four CSO locations, thirty of which discharge to the Don River and Massey Creek with the remainder discharging to the central waterfront. Plant by-pass from the Main STP occurs directly to the Lake. Overflow from the plant by-pass occurs relatively infrequently compared to direct CSO.

The Strategy for Improvement of the Don River Water Quality (Component Action # 4.2.2) estimated a cost of \$100 million for storage and treatment of CSO discharging to the Don River only, based on 1 overflow/year/CSO on average. The study did not address the costs of controlling the central waterfront CSOs. The Strategy noted that this reduction would provide aesthetic and fisheries benefits and would have some impact on bacteria discharge, but would have little benefit in terms of toxic loadings, primarily because of the relatively small volumes involved compared to storm sewer discharges.

By far the greatest costs and most difficult implementation would occur in conjunction with the central waterfront CSOs. The total volume of CSO is large across this area and land for construction of detention tanks is limited.

Metro has provided the following estimates for the reduction of CSO on the Don system.

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### TOTAL ESTIMATED COST FOR I/I AND CSO CONTROL DON SYSTEM (\$ Millions)

<u>Measure</u>	<u>Implementor</u>	<u>Cost</u>	<u>Metro</u>	<u>Share Loc. Mun.</u>	<u>Province</u>
Detention Toronto	Local, Metro	286.0	48.0	143.0	95.0
East York	Local, Metro	21.2	3.5	10.6	7.1
Scarborough	Local, Metro	12.3	2.0	6.2	4.1
Total		319.5	53.5	159.8	106.2

Note 1: These projects are contingent upon expansion of the Main STP at an estimated cost of \$89 million. STP costs are not included in totals here to avoid double counting. Refer to Component Action # 2.1.1.

Note 2: The provincial share is based on the maximum contribution of 33%. Provincial sharing typically ranges from 15 to 33%

### Potential Program Benefits

Combined sewer overflows are of concern primarily because of the potency of the discharge and the potential presence of diluted industrial wastes and the probable presence of pathogenic organisms. The volume of discharge, the pollutant load, and the number of discharge points however, are all small in comparison to wet weather discharge from separate storm sewers. The high cost of reducing CSO to once per year on average suggest that limitations to expected benefits should be clearly recognised. The principal benefits associated with CSO reduction are:

- a) elimination of a probable source of human pathogenic organisms. It is noteworthy that this is an unquantifiable benefit because pathogenic organisms are not amenable to regular monitoring.
- b) reduction in fecal coliform loads. CSO are high concentration source of fecal coliform (FC) bacteria during wet weather and likely contribute to sediment bacteria loading which may produce dry weather problems. The short duration and relatively small volume of this discharge limits the impact of the source. Work done during the Humber River study indicated that while CSO elimination had a major impact on riverine FC levels immediately after rainfall the effect was masked as large volumes of storm water runoff entered the river.
- c) elimination of a potential source of toxic chemicals. Studies are under way under the Toronto RAP to quantify the toxic organic load from both CSO and storm sewers (Component Action # 7.1.1). In terms of loads, it is known that CSO contribute a very low percentage of heavy metals such as lead and copper. In terms of concentration and potential impacts on the fishery the Don River Strategy report indicates that the effect of a CSO is approximately the same as might be expected from a 100 litre spill of gasoline or a 10 mm storm water runoff event.
- d) aesthetic improvement. Elimination of a source of toilet paper and other disagreeable matter will yield a significant benefit.

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Environmental benefits will be derived in limiting CSO, but it should be recognised that in most instances this will not result in significantly fewer beach closures, a significantly improved aquatic environment or other clearly demonstrable benefits, except in very localized areas. Major reduction of storm water inputs, in addition to CSO control will be necessary to achieve measurable improvement.

CSO reduction measures may be expected to enjoy a greater general public support than other remedial measures because the reduction of diluted sanitary discharge is intuitively desirable.

### Dependent Projects

CSO remediation is dependent, either directly or indirectly upon:

- STP expansion at the Main and Humber plants
- expansion of sanitary trunk capacity in both the Don and Humber systems
- Lakefilling policy (required for Main STP expansion)
- North Toronto STP remedial measures (competition for capacity)
- ongoing research (source significance for toxic contaminant loads)

The elimination of CSO discharges through the use of storage facilities assumes that the plant(s) receiving the waste have capacity to treat it. The capacity the plants must be available at the same time as the completion of the CSO work without limiting future development. Metro Toronto has undertaken two studies to examine the capacity and improvements required to deal with the CSO load. The Humber plant and system study has been completed and a draft report on the Main plant and Don system has recently been released to Metro. Each study has confirmed the need for both additional plant and system capacity to allow acceptance retained CSO. Failure to provide this additional capacity would result in deterioration of effluent quality and/or more frequent plant by-pass.

The sanitary collection system delivers the CSO waste to the waste water treatment plant. The design of the CSO facility would have to include an analysis of the available capacity. These analyses are required to ensure that utilization of the trunk capacity would not create surcharging and resultant basement flooding.

As noted under Component Action # 2.1.1, expansion of capacity at the Main STP will require lakefilling. The Provincial policy on lakefilling will therefore affect the ability to treat retained CSO. Similarly any decision to divert flow from the North Toronto STP would require additional capacity, in both the sanitary trunk system and at the Main treatment plant.

The options of reducing CSO to once per year on average across the Metro RAP area, are based on the impact of CSO on beaches and the assumption that discharge of diluted sanitary waste is undesirable. In terms of toxic substances such as metals, CSOs are a relatively minor source because of the small volumes discharged. The question may arise during the

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selection of options for the RAP regarding the priority and scheduling which should be accorded CSO remediation, due to the high cost and anticipated difficulty in measures an improvement until storm water controls are also implemented. The outstanding question in regard to CSOs is their significance as a source of persistent organic toxins. Component Actions # 7.1.1, 2, 4 were initiated, in part, to provide this information. Results under these actions will be available starting in late 1990. The results may provide information necessary to determine the priority for CSO policy implementation, especially in areas such as the central waterfront where access will be a problem.

### Monitoring Requirements

At present the City of Toronto has the capability to predict the volume of CSO discharge from its system using a calibrated (QQS) computer model. The current sampling under Component Action # 7.1.1 will provide information on the composition of CSO for toxics. Extension of work under this action will involve development of additional computer models for CSO volumes in the other cities.

Since it is proposed that CSO remediation will focus on a level of reduction corresponding to one overflow/CSO/year on average a specific monitoring program for CSOs is not warranted. The impact of source reduction will be addressed by the overall monitoring strategy adopted under the RAP as part of its implementation. Devices to record overflow events will be required to ensure that CSO remediation designs are performing as intended.

### Reporting

It is anticipated that two types of reporting will be required if CSO reduction is adopted. Since implementation will require large resource commitments and therefore phasing over many years, reporting in the initial period will consist primarily of progress reporting on project implementation to ensure compliance with the adopted schedule. Once projects start to come on line reporting will be expanded to include the number, size and significance of CSO from each overflow point. Both types of information will be included in the annual report of the Toronto Rap so that progress can be monitored.

### Implementation

The remedial programs aimed at CSO reduction have been driven in the past by the need to prevent the damage and health hazard associated with basement flooding and have involved sewer separation as the primary means of mitigation. While sewer separation remains the long term goal of Metro, the volumes of CSO remaining have been reduced to a point where retention with subsequent treatment has become a possible, if expensive option. Sewer separation is becoming an increasing less cost effective means of addressing the multiple problems of CSO. The economics and the additional water quality benefits of CSO retention suggest a change in the approach to CSO control. Recent projects such as the proposed

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construction of storage tanks on the eastern beaches (component Action # 1.1.1) are oriented towards the open environment of the lake and rivers.

Several obstacles to the use of CSO retention have been eliminated in recent years including:

- revision of the Ministry of Transport's subsidy policy which had previously been restricted to sewer separation projects

- revision of the Metropolitan Toronto Act which restricted Metro to funding local municipalities for sewer separation was expanded to include other pollution control measures

- completion of capacity studies for the Humber and Don systems identifying system and treatment plant needs

Impediments to the construction of CSO tanks remain. The most important of these is the need for extensive construction of treatment and transmission facilities in advance of the construction of CSO facilities. The proposed policy suggests a 20 year timeframe for the correction of CSO because of the need to finance the large expenditure. It may therefore be anticipated that a minimum of five years is required before the actual construction of CSO detention facilities can commence, except in the case of special projects such as the Eastern Beaches tanks.

### Potential Delays

The potential for delay of specific CSO projects is high, even if funding is available. The potential cause of delay are listed below:

- a) The construction of CSO storage facilities requires two levels of provincial approval (Ontario Water Resources Act and Environmental Assessment Act). The Ontario Water Resources Act defines these structures as a sewage works accordingly requires an approval. The present backlog of O.W.R.A. approvals is approximately six months.

Under the Environmental Assessment Act, municipalities must complete a class Environmental Assessment. The Class EA approach requires the proponent to write a detailed design report, hold public meetings, receive comments and respond to these comments before receiving approval to proceed. Concerned parties may request a "bump-up" to a full EA if they are not satisfied. This occurred in the case of the eastern beaches tanks and while the "bump-up" request was not granted, a delay in project implementation did ensue. Completion of the RAP will benefit the CSO proponent due to its early consultation with the public, but it will not eliminate the need for the class EA on each individual project, because of the need to address the concerns of citizens living in the vicinity of the specific site.

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b) CSOs tend to occur in the older built up areas. These areas generally lack open space to install storage facilities which creates design and cost problems. The construction of both CSO storage facilities and increases in capacity of existing infrastructure can often disrupt the normal flow of surface transportation. While these considerations are addressed during design and scheduling perfect solutions are often not possible. This may increase public resistance to a project or may require delays to take advantage of particular seasons.

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### Summary Information for Implementation

Component Action:	Virtually Eliminate CSO
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	STP Expansion Sanitary Trunk Expansion Lakefilling
Implementation Responsibility:	Metro Toronto, East York, York, Scarborough
Funding Responsibility:	Province, Metro, local municipalities (potential Federal govt)
Additional Costs Range:	\$ 390 million over 20 years exclusive of treatment cost (see also CA # 2.1.1 & 2.1.2)
Monitoring Requirements	none specific to individual CSOs
Reporting Requirements:	annual progress, CSO volumes
Timeframe:	20 years
Potential for Delay	high
Potential Reasons for Delay	EA, other funding priorities

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### Reference Documents

1. Metropolitan Toronto Policy to Manage Sewage Collection and Treatment in Wet Weather. (Preliminary Draft - Metro Works)

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### COMPONENT ACTION # 2.2.2:

#### Trace and Disconnect Sanitary Connections to the Storm Sewers

Sanitary cross connections to storm sewers usually involve an improper connection of a domestic discharge (ie. toilets) to the storm sewer. The cross connection allows the entry of human wastes into the storm sewer system. If the storm sewer contains water from infiltration, the wastes are discharged during dry weather conditions, contributing to the bacterial problems at times of low flow. When the sewer does not contain infiltration water, the domestic flow will usually be insufficient to permit discharge and the wastes will reside in the sewer until the next storm event.

Sanitary cross connections are capable of producing a significant health hazard through the introduction of indicator bacteria and pathogens, during dry weather conditions. During wet weather their impact is negligible compared to the quantities of bacteria washed off of streets and lawns. Sanitary cross connections are only one of several possible causes of elevated bacterial counts in storm sewers during dry weather. Other sources include animals (raccoons, rats) and decaying organic matter and refuse.

The removal of cross connections to storm sewers is considered important in reducing pollutants to rivers during low flow periods. The TAWMS Humber study estimated that bacteria contributions from outfalls during dry weather accounted for about 75% of the river load. No estimate could be made as to how much of this load was attributable to illegal cross connections. The study recognized that tracing and disconnecting cross connections would be a difficult task and indicated that alternate remedial measures might be required.

As the concept of basement apartments becomes more popular and widespread, the likelihood of "new" cross connections occurring, increases. In such circumstances, "grab" sampling is just not effective since detection depends on when the "offending" connection is used. Wire basket straining is also limited in that the apartment or home may not be occupied for the period of the test. These difficulties are seen as impediments to the effectiveness of the programs.

The two other impediments, relate to:

#### (i) Jurisdiction

Where cross connections are found to exist within the road allowance, the responsibility remains with the Works Departments. However, where the cross-connection is inside the private property, the Works Departments no longer have authority. The Building Departments are notified and through their plumbing inspectors, ensure that the cross connection is removed. The responsibility of ensuring that sanitary discharges are excluded from storm sewers remains with the Works Departments.

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### (ii) Access to Homes

This problem stems from two main reasons. Firstly, many households are unoccupied during normal working hours and secondly, the home owners have in some cases proved to be uncooperative.

Possible solutions to the first impediment will have to be found within the municipal organization. Improved cooperation for faster action is required. With regard to uncooperative property owners, it may be necessary to revise legislation in order to give sufficient authority to the departments concerned.

### Existing Programs

Within the study area, the only active cross connection programs are in Metropolitan Toronto and Peel Region. The program in Peel is small and in response to a specific watershed study. The other municipalities outside of Metro address cross connections only when a problem is noted. It is generally felt that normal inspection procedures prevent illegal connections in new developments, and that the limited amount of renovation occurring in the Regions reduces the potential for this kind of problem.

Under TAWMS and subsequently WWQIP, the storm sewer outfalls within Metro and parts of York Region have been sampled to identify sewers where cross connections are a problem. Of the 2319 outfalls sampled, 1318 were found to be active (greater than 0.1 litre/sec flow) during dry weather. Over 200 of these outfalls were classified as priorities for remediation because of high bacteria counts. Subsequent sampling by the municipalities has resulted in the identification of additional priority outfalls.

The local municipalities within Metro, with the financial assistance of Environment Ontario through WWQIP, have all undertaken programs to trace and disconnect cross connections. Dye testing of individual homes is the only definitive method of identifying cross connections, although other methods are used to zero in on problem areas. The programs are labour intensive, and as a result relatively expensive in terms of the number of cross connections identified. Thousands of homes have been tested but problems with access (many homes are unoccupied during the day) have hampered the programs.

Cross connections are corrected when they are found. There may be many cross connections within a sewer system feeding to a single outfall. In order to remove a sewer outfall from the priority list it must be re-sampled to demonstrate that the remedial works have been effective. In many cases remedial actions have taken place but the sewers have not been re-sampled.

A comparison of the budgets reported by the different municipalities for existing 'trace and disconnect' programs is presented below.

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## Existing Municipal Practice - Domestic Cross Connections

REGION	MUNICIPALITY	# PRIORITY OUTFALLS	CROSS-CONN TRACED	BUDGETS		PROGRAM PRIORITY
				1988	1989	
Durham	Durham	26*	-	28*	28*	M
	Pickering	-	-	-	-	-
Metro	City of York	22	-	40	40	M
	East York	20	-	0	0	L
	Etobicoke	48	20	58	92	L
	North York	79	50	66	70	H
	Scarborough	37	39	107	115	M
	Toronto	43	45	22	12	H
	Metro	4**	-	-	-	-
	Non-Municipal	2	-	-	-	-
Peel	Brampton	-	-	-	-	-
	Caledon	-	-	-	-	-
	Mississauga	-	-	-	-	-
	Peel	-	1	59	59	L
York	Markham	10***	-	-	-	-
	Richmond Hill	10***	-	-	-	M
	Vaughan	7***	-	-	-	-
	Whitchurch	-	-	-	-	-
	York	-	-	-	-	-

\* none of the Durham outfalls are within the RAP study area

\*\* Metro has concentrated its efforts on the delisting of "chemical" priority outfalls.

\*\*\* only outfalls in the Don River basin have been prioritized.

Note: 1. Budgets are given in thousands (1988 \$)  
 2. MOE provides a subsidy of 50% for approved programs inside Metro.  
 3. Numbers of priority outfalls are as per MOE records.

Storm sewer outfall monitoring programs for the Humber River, Don River and Mimico Creek were funded entirely by the MOE. Cross connection programs for local municipalities in Metro are currently funded under the Waterfront Water Quality Improvement Program (WWQIP). Fifty percent of the funds are provided by the MOE. Municipalities outside of Metro are not eligible for funding under this Program. Work is currently ongoing to trace and remove cross connections to the storm sewer. Progress however is generally difficult and slow. Few municipalities outside Metro Toronto reported cross connection removal programs; this is likely due to lack of MOE funding to these outlying municipalities and previous exclusion in the earlier TAWMS studies.

In 1988 a total of \$284,800 was spent by the local municipalities within Metro, on this program. Thirteen domestic cross connections were identified, as well as 2 commercial cross connections, representing an overall unit cost of \$19,000 per cross connection. If however, we consider Etobicoke, North York and Scarborough separately, the cost of identifying each cross connection is \$10,000, \$12,000 and \$21,360 respectively.

Two basic measures of program effectiveness are generally considered by the municipalities. The first is the number of homes tested and the second is the number of priority outfalls

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delisted. Delisting of outfalls requires that they be re-sampled to confirm that the bacteria load has dropped below the action level.

The City of Toronto is of the opinion that it is inappropriate to rate the effectiveness of this program by the percentage of homes checked. This is a noteworthy comment in that the primary objective of the program is to delete priority outfalls, not to check homes. Toronto has been successful in eliminating 25 priority outfalls out of a total of 43 previously identified. Toronto's program uses continuous monitoring and other methods of investigation to identify sanitary discharges to storm sewers.

The highest percentage of homes checked to date is 8% in Scarborough, followed by Etobicoke and North York with 7.7% and 7.5% respectively. Etobicoke and the City of York have indicated that a further 2000 homes will be checked during 1989. Yearly checking of homes is generally in the region of 1000 to 2000 homes. Even if the upper limit is maintained, checking will take from 20 years (East York) to 46 years (Scarborough) to complete. Based on the funding information received, cost per establishment checked is approximately equivalent, at around \$40/per establishment.

The Region of Peel spent nearly \$60,000 in 1988 to check 20 homes; one cross-connection was found. The program priority is rated as low; it appears that the program is run on an "as required" basis. A \$50,000 capital expenditure was identified but there is no indication of what this relates to. It is believed that the figure entered as capital expenditure should be considered as an allocation towards the 1989 budget. The total cost of the program would then be about \$10,000 which relates better to the level of effort and the low priority attached to the program.

The Cross Connection Tracing and Removal program comprises only about 1% of the total expenditure indicated in the questionnaires for surveyed programs in each municipality. This would appear to indicate that the program is not high priority. Some municipalities indicated that few, if any, cross connections exist and this may explain the reduced level of effort.

The priority rating in East York is low due to funding restraints. Etobicoke ranks the program priority as low, not due to the lack of funding, but to the low number of cross connections being identified. The City of York will attempt to allocate more funds in 1989 and thereby raise the program priority from low to medium. All other municipalities rank the priority of their programs as either medium or high.

The information from the Metro municipalities regarding staffing costs indicate that between 85% and 91% of the total program cost can be attributed to staffing. The general feeling among the municipalities is that the expenditures are very high in relation to successful identification of cross connections. Domestic cross connections, arising generally from erroneous and illegal connections, are particularly difficult to trace.

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### Potential Program Improvements

Responses received from the municipalities indicate two different opinions on what would constitute an optimum program. In the first case, routine checking of establishments is proposed. The scheme would involve the checking of establishments on a 10 or 20 year cycle. The second proposal towards reaching an optimum program consists of the continuous monitoring of outfalls and tracing of pollution sources.

The City of Toronto has had notable success over the past years in delisting 25 priority outfalls. The City utilizes an effective combination of tracing from the outfall and house checking. Collection and testing of samples at strategic junctions is carried out until the source location has been narrowed down to as small an area as possible, preferably a block of houses. Then dye testing is used to identify the cross connection(s). Crews of 2 to 4 persons can complete a house in 20 to 40 minutes. The advantage of this method is that only houses in areas known to be sources of pollution, are tested.

In the Regions outside Metropolitan Toronto, studies such as TAWMS have not been carried out except within the Don River basin. MOE subsidies have not been provided to municipalities outside of Metro. Cross connection tracing appears to be done purely on a basis of house checking. In these areas where outfalls have not been prioritized it will be necessary to carry out monitoring studies. After this is done it will be possible to embark on a tracing and removal program. The program would require a fully equipped laboratory and sufficient funds for testing. The expansion of existing laboratory facilities or construction of new facilities overlaps to some extent with the enforcement of the sewer use by-law.

Five potential levels of action are outlined below:

- a) complete delisting of existing priority outfalls and terminate program
- b) extend prioritization of outfalls to the Regions and complete a one time delisting
- c) extend and upgrade programs to allow a complete cycle of prioritization and delisting every 10 years
- d) expand programs so that all residential properties are checked on a 20 year cycle
- e) implement legislation requiring that homeowners provide a certificate indicating that the residence has been dye-tested within the last 5 years, as a condition of land transfer or mortgage discharge

#### **A. Complete Existing Efforts and Terminate Program**

The existing program of tracing and disconnection which has been under way inside Metro since 1984, represents a departure from the historic practice of responding to only specific complaints and problems. The program was undertaken as a pollution abatement action early in the TAWMS program because it was recognized that many storm sewers were contributing significant fecal coliform bacteria loads during dry weather. It was recognized at the time

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that the procedures were untested. The Humber River Water quality Management Plan therefore recommended "that an effective program be established to reduce dry weather bacteria counts" and noting that the effectiveness of existing this program had not been established further recommended:

- 1) an assessment be made of the effectiveness of the trace and disconnect program
- 2) that the feasibility of collecting dry weather flow and diverting it to the sewage treatment plants be determined for priority outfalls
- 3) that ultraviolet disinfection be tested in a pilot site setting to determine the feasibility of direct treatment of dry weather flows.

Between 1984 and 1988, approximately \$1.5 million was spent on the trace and disconnect program inside Metro Toronto. Two thirds of this amount was spent on identification and the remainder on correction. These figures do not include the initial cost of sewer prioritization, nor the disconnection costs absorbed by residents. During this period about 175 illegal connections were identified and 115 were corrected. This represents a long term average of about \$12000 per cross connection. The impact of eliminating these cross connections cannot be determined because of the residual effects of other bacterial sources. The program is not regarded as cost effective by the municipalities involved. The program may be considered moderately successful, in an operational sense, because it has resulted in delisting of about 20% of the 280 priority sewers originally identified.

Consideration needs to be given to whether this program should be continued or a more cost effective means sought. Unfortunately, no proven alternate methods are currently available and a decision to curtail the program will simply mean stopping the current actions. While this would result in a cost saving to both the Province and local municipalities, a large number of priority sewers would remain. This is clearly unacceptable. The option therefore becomes one of continuing the current programs until existing priority sewers are delisted. No efforts beyond this would be undertaken until alternate and more cost effective measures were determined.

The projected costs of this course of action are give below.

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### Estimated costs for Delisting Existing Priority Outfalls

REGION	MUNICIPALITY	# PRIORITY OUTFALLS	OUTFALLS		WORK ONGOING	ESTIMATED COST		TOTAL
			DELISTED	REMAINING		MUN.	MOE	
Metro	City of York	22	4	18	18	405	405	810
	East York	20	0	20	15	450	450	900
	Etobicoke	48	10	38	35	790	785	1575
	North York	79	27	52	7	1170	1170	2340
	Scarborough	37	0	37	31	835	830	1665
	Toronto	43	25	18	14	405	405	810
	Metro	4	0	4	0	90	90	180
	Non-Municipal	2	0	2	0	90	0	90
York	Markham	10	0	10	1	450	0	450
	Richmond Hill	10	0	10	0	450	0	450
	Vaughan	7	0	7	0	315	0	315
TOTAL		282	66	216	121	5450	4135	9585

Note: 1. Costs are in thousands of 1988 dollars and are based on an estimate of 3 cross connections per priority outfall @ \$15 000/cross connection

2. Continuation of existing MOE funding policy assumed.

3. Priority and delisted sewers are according to MOE records; several municipalities have requested delisting of additional sewers and decisions are pending.

Based on the 1988 spending level of approximately \$285 000, the projected time to complete the delisting of existing priority sewers is about 34 years. Many municipalities who have been actively pursuing delisting would of course, complete their programs much earlier. Continuation of the program to completion would require a provincial contribution of approximately \$122 K annually, over the 34 year period.

### **B. Extend Existing Programs to the Regions and Complete a Single Prioritization/Delisting Cycle**

The initial TAWMS studies of bacterial priority outfalls were conducted on the Humber River below Steeles Avenue. Subsequent prioritization of Mimico, Highland Creek and the Rouge River were also conducted within Metro's boundaries. The TAWMS study of the Don River did establish a priority listing for outfalls in Vaughan, Richmond Hill, and Markham, within York Region, as well as in the Metro municipalities. All prioritization studies were conducted under TAWMS and funded entirely by MOE.

The Waterfront Water Quality Improvement Program (WWQIP) has been the means of encouraging the trace and disconnect program. Under WWQIP the Province funds up to 50% of approved municipal projects. The agreement only allows funding of projects conducted by Metro municipalities. The lack of delistings in the municipalities outside of Metro is due to the lack of local priority, the poor cost-effectiveness record inside Metro, and the absence of Provincial subsidy.

Extending the existing program to cover all watersheds within the Toronto RAP area would require studies to establish a listing of priority sewers in areas which have not been sampled, extension of the Provincial cost sharing, and agreement by the local municipalities that this is a program worth pursuing. The estimated costs of such an extension are provided below.

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## ESTIMATED COST OF SEWER OUTFALL MONITORING

MUNICIPALITY	ESTIMATED NUMBER OF OUTFALLS	SAMPLING <sup>1</sup> AND REPORTING UNIT COST \$	SAMPLING <sup>2</sup> AND REPORTING TOTAL COST \$	LABORATORY <sup>3</sup> COST \$	CROSS CONN TRACING & REM. COST \$	TOTAL COST \$
<b>DURHAM REGION</b>						
Pickering	90	190*	27	45	630	702
Durham Region	N/A					
<b>METRO TORONTO</b>						
East York	90	190*	0**	0**	900	900
Etobicoke	590	160	0	0	1,575	1575
North York	720	160	0	0	2,340	2340
Scarborough	760	160	0	0	1,665	1665
Toronto	400	180	0	0	810	810
York	120	190*	0	0	810	810
Metro Toronto	N/A					
<b>PEEL REGION</b>						
Brampton	320	180	58	160	2,240	2458
Caledon	30	190*	16	15	210	421
Mississauga	760	180	137	380	5,320	5837
Peel Region	80	190*	25	40	560	625
<b>YORK REGION</b>						
King	20	190*	14	10	140	164
Markham	200	190*	48	100	1,400	1548
Richmond Hill	70	190*	23	35	490	548
Vaughan	120	190*	33	60	840	933
Whitchurch/ Stouffville	20	190*	14	10	140	164
York Region	110	190*	21	55	770	846
<b>TOTAL</b>	<b>4,430</b>		<b>416</b>	<b>910</b>	<b>20,840</b>	<b>21,750</b>

- Notes: <sup>1</sup> - Assumes initial visit of each outfall, 40% sampled once, 15% sampled four times.
- \* - For reduced economic efficiency for less than 300 outfalls, \$10,000 added to total cost.
- <sup>2</sup> - Unit cost allowance of \$500/outfall. Number of samples taken is number of outfalls X 2. Tests include ICAP metals, phenols, bacti, and 5 - 6 simpler tests.
- \*\* - Metro municipalities are assumed to have completed their priority sampling

Assuming an extension of the WWQIP program to all municipalities within the RAP area, a total provincial contribution ranging up to approximately \$ 11 million could be required. If the program is scheduled over 20 years, this amounts to an annual contribution of up to \$505 K.

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### **C. Extend and Upgrade Programs to Allow a Complete Cycle of Prioritization and Delisting Every 10 Years**

This level of enhancement would be identical to the program improvement under B, but would require that the program be repeated on a ten year cycle. Implicit in this improvement is the assumption that the program in its present form is worth continuing and that technological advances have not provided a less costly alternative. While it is recognized that prioritization and disconnection cycles may become less costly as the cycle is repeated in developed areas, this will likely be offset by the addition of new development. Costs have therefore been assumed to remain constant, in 1988 dollars, over time.

The estimated costs for program cycles after the initial one are shown below for municipalities within Metro Toronto. Cost estimates for municipalities outside Metro, where such programs are not under way will be the same as those noted under B. On a RAP-wide basis this level of improvement would require approximately \$2.2 million per year between 1990 and the year 2000, rising to \$3.4 million/yr in subsequent 10 year cycles. The cost to individual municipalities would depend on the cost-sharing arrangements between participating agencies. Provincial costs would range up to \$ 1.1 and \$ 1.7 million, respectively. Municipal costs would be expected to rise in developing municipalities as more sewers are constructed.

#### **ESTIMATED COST OF SEWER OUTFALL MONITORING**

MUNICIPALITY	ESTIMATED	SAMPLING <sup>1</sup>	SAMPLING <sup>2</sup>	CROSS CONN		
	NUMBER OF OUTFALLS	AND REPORTING UNIT COST \$	AND REPORTING TOTAL COST \$	LABORATORY <sup>3</sup> COST \$	TRACING & REM. COST \$	TOTAL COST \$
METRO TORONTO						
East York	90	190*	27	45	630	702
Etobicoke	590	160	83	260	3,640	3982
North York	720	160	115	360	5,040	5515
Scarborough	760	160	122	380	5,320	5822
Toronto	400	180	72	200	2,800	3072
York	120	190*	33	60	840	933
Metro Toronto	N/A					
Other Municipalities			452	1,305	12,740	14,497
TOTAL	4,430		868	2,215	31,010	34,093

Notes: <sup>1</sup> - Assumes initial visit of each outfall, 40% sampled once, 15% sampled four times.

\* - For reduced economic efficiency for less than 300 outfalls, \$10,000 added to total cost.

<sup>2</sup> - Unit cost allowance of \$500/outfall. Number of samples taken is number of outfalls X 2. Tests include ICAP metals, phenols, bacti, and 5 - 6 simpler tests.

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### **D. Expand Programs so that all Residential Properties are Checked on a 20 Year Cycle**

This level of improvement would by-pass the need for sewer prioritization because all homes would be checked on a scheduled basis, over a 20 year period. In addition to the resources required, legislative changes would be needed to make inspection mandatory to the homeowner.

Cost estimates for inspection are based on current municipal figures which indicate a cost of \$40 per household checked. Costs to remedy the cross connections found are based on municipal experience within Metro Toronto. Data provided by Scarborough, North York, and Etobicoke indicate a cross connection identification rate of 6/1000 homes checked. It is anticipated that on average municipal costs associated with the physical removal of the cross connection would be \$ 2500 each. This represent an average accounting for the fact that in many instances there is no municipal responsibility. This figure does not account for costs incurred by individual owners when the responsibility for correction is theirs.

Using a period of 20 years, the annual spending within the RAP area would be approximately \$3.2 million. The cost to individual municipalities would depend on the cost-sharing arrangements between participating agencies. Provincial costs would range up to \$1.6 million/year. Municipal costs would be expected to rise in developing municipalities as more homes are constructed.

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### Estimated Costs for Complete Residential Checking on a 15 Year Cycle

MUNICIPALITY	POPULATION (1985)	HOUSEHOLDS (1986)	INSPECTION	COSTS REMOVAL	TOTAL
<b>DURHAM REGION</b>					
Pickering	45,758	15,687	627	235	863
<b>METRO TORONTO</b>					
East York	97,679	44,389	1,776	666	2,441
Etobicoke	298,490	113,501	4,540	1,703	6,243
North York	556,308	201,580	8,063	3,024	11,087
Scarborough	461,957	164,755	6,590	2,471	9,062
Toronto	606,247	275,850	11,034	4,138	15,172
York	133,856	55,301	2,212	830	3,042
<b>PEEL REGION</b>					
Brampton	177,675	58,959	2,358	884	3,243
Caledon	28,701	9,724	389	146	535
Mississauga	359,495	124,601	4,984	1,869	6,853
<b>YORK REGION</b>					
King	15,733	5,314	213	80	292
Markham	105,341	35,986	1,439	540	1,979
Richmond Hill	44,358	16,077	643	241	884
Vaughan	56,766	20,695	828	310	1,138
Whitchurch	14,453	5,524	221	83	304
Totals			45,917	17,220	63,138

Note: All costs are in thousands of 1988 \$

### **E. Implement Legislation Requiring Inspection as a Condition of Sale**

The main short-comings of all existing and improved programs discussed to this point is the relatively low cost effectiveness and the difficulties encountered in implementation. These stem from the "needle in the haystack" situation caused by the relatively small number of improper connections scattered throughout a very large urban area.

Following the precept that those who are the source of the pollution should be responsible for cleaning it up, consideration should be given to solutions which put the onus on the homeowner. This is consistent with the philosophy applied to MISA which require industries to absorb the costs of self-monitoring.

A potential improvement to existing programs would be to require, as a condition of sale and land transfer, that a homeowner provide a certificate indicating that his building has been tested and found to be properly connected to the sewer systems or that if improperly connected the work has been done to remedy the problem. If this type of approval requirement could be incorporated in land transfer requirements, it would save governments the expenditures related to tracing, provide a continuously updated check on household plumbing, and make the entire population aware of their potential to affect the environment.

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It could have a significant impact on municipal budgets however because the average turnover in Toronto's market is about 3 years. This could set a stiff pace for correction works.

The means of implementing such a measure needs to be investigated, both in terms of required legislative changes and the means by which the certificates would be provided. Possibilities for the latter would include: use of licensed contractors paid by the owner; or service provided by the municipality at a fee. In either case the program could be structured to be self-supporting, except where the illegal connection is found to exist on City property and is therefore the responsibility of the City. In terms of impact on the homeowner, the sale of a property often provides more readily available resources than at any other time, thereby easing the burden of both testing and correction.

This potential program improvement has been referred to the Technical Advisory Committee for comment and further development as appropriate. For the purposes of this document it will be assumed that it is feasible and that additional staff costs can be addressed through a fee structure. The projected cost to municipalities would therefore be the same as that shown for "Removal" under D. This cost of \$17.2 million within the RAP area would be expected to occur over a 10 Year period, and would drop off sharply thereafter as improper connections at the road sewer are eliminated. The costs to individual municipalities would be dependent on the cost sharing arrangements agreed upon. A provincial contribution ranging up to \$ 850 K/yr could be required.

### Potential Program Benefits

The potential benefits of "trace and disconnect" programs must be placed in perspective in terms of possible improvements to use of our water resources. All of the programs, existing through the various types of improved programs will reduce the discharge of domestic sewage through our storm sewer systems. Since domestic sewage contains pathogenic material the programs have a clear health benefit. Quantification of this benefit is virtually impossible however.

Illegal domestic connections to storm sewers are only one source of fecal contamination originating within the urban watershed. Other sources, including pet and wild animals are expected to continue to be a significant source of the fecal coliform indicator bacteria which is used as a guide to advise the public regarding the safety of our rivers and the Lake. It is not expected that "trace and disconnect" programs will result in a major improvement in the status of our waters for body contact recreation, except in some isolated cases. While the programs will result in improvement therefore, they will not likely be seen as such by the general public as beaches and rivers will continue to be posted, advising of health risk.

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### Dependent Projects

The execution of these programs are not dependent upon other projects except in terms of the availability of resources. Related projects include agricultural programs, pet by-laws, pilot stormwater projects and combined sewer overflow controls. All of these seek to reduce bacterial contamination during wet weather, dry weather or both.

### Monitoring Requirements

Monitoring for fecal coliform bacteria is routinely conducted at public beach location by the Health departments of the different Cities. Routine dry weather monitoring of rivers is warranted if program improvements are adopted. The purpose of this monitoring would be to gauge progress in reducing average bacterial counts. This will provide useful information during updates and reviews of the Remedial Action Plan.

### Reporting

Municipalities within Metro currently report on their progress with respect to illegal connections. If improvements are adopted the reporting will need to be standardized for all municipalities. Schedules and rates of completion will be necessary because these types of programs are relegated to a low internal priority because of the lack of measurable improvement associated with them.

The specific contents of reports would be dependent upon the option selected.

### Implementation

Implementation schedules will depend upon the option selected. In general implementation can be undertaken rapidly (within 1 to 2 years) as the main requirements are the approval of budgets and the hiring/contracting of staff. The options which require extension to the Regions will require at least 1 year to allow prioritization of outfalls. The option that requires legislative changes could vary in terms of the time required for implementation, depending upon the number of levels of legislation required and the concerns raised by the public.

### Potential Delays

The main delays expected will revolve around cost sharing and commitment of resources to this type of program. It is generally regarded as inefficient and receives only limited support from both the Municipal and Provincial levels.

At the provincial level it should be recognised that 50% funding , which has been provided as an incentive under the WWQIP program, was intended to be a short term measure and may

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be inappropriate for continuing programs. Further, extension of the program to municipalities outside of Metro will place a substantial burden on the province. It is likely that a reduction in the percentage of the subsidy would be required to compensate for any extension of the program outside of the existing boundaries.

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### Summary Information for Implementation

Component Action:	Illegal Connections
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Agricultural Controls Stormwater Controls Pet By-Laws CSO Controls
Implementation Responsibility:	municipalities
Funding Responsibility:	municipalities/province
Additional Costs Range:	\$0.25 - \$3.4 M (annually)
Monitoring Requirements	yes/rivers
Reporting Requirements:	yes/option dependent
Timeframe:	1-2 years
Potential for Delay	medium
Potential Reasons for Delay	low cost effectiveness

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### Reference Documents

Metro Toronto Remedial Action Plan : Documentation of Current Remedial Programs  
R.V. Anderson Ltd., 1989

Humber River Water Quality Management Plan  
TAWMS 1986

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### COMPONENT ACTION # 2.2.3: Utilize Municipal Sewer Use By-Laws to Reduce Contaminant Loading From Industry to the Sewage Treatment Plants and Storm Sewers

Municipal sewer use by-laws are currently used by all municipalities to regulate what can be discharged to sanitary and storm sewers. The municipalities in the Toronto RAP area are currently using by-laws based on a model developed in 1975 by MOE and the Municipal Engineers Association (MEA), although in some cases they have been updated to reflect more current knowledge. A revised version of this model by-law was published in August 1988 and is currently under consideration by the municipalities.

Sewer use by-laws provide the authority for many of the ongoing remedial measures which have been undertaken by municipalities in recent years. They are the basis inspection and sampling of industries, trace and disconnect programs for chemical priority sewers, spills control programs, and disconnection of stormwater connections to sanitary sewers.

The revised model by-law represents a major improvement and includes:

- discharge limits for additional heavy metals
- lower discharge limits for several metals
- prohibition of dilution to achieve limits
- prohibition of discharge of specified hazardous materials, waste pesticides/herbicides, and industrial wastes and chemicals listed in schedules 1-3 of Regulation 309
- additional industrial reporting requirements
- concentration limits for surcharged parameters in agreements
- concentration limits for specific parameters in compliance programs
- a standardized compliance program agreement
- a more comprehensive storm water section
- spills reporting section
- guidelines for industrial best management practices plans for contaminated runoff

The revised model by-law is a more comprehensive document than its predecessor. It was developed as an interim measure, leading into the requirements of the MISA Sewer Use Control Program. Adoption of the revised by-law is voluntary. Several municipalities, including Metro will adopt at least portions of the revised by-law in the near future. Certain features of the model by-law represent a departure from existing municipal practice (eg. expanded storm sewer sections; best management practices plans) and there is a reluctance to adopt some of these until the specific requirements of the MISA regulation are known.

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### Existing Programs

Before comparing the individual municipal programs, an understanding of the roles played by the Regions and the local municipalities is needed. All the municipalities, except Pickering, have indicated some responsibility with respect to this type of program.

There would appear to be a shared or overlapping responsibility between the regional and local municipalities. Generally, the regional municipality has a more developed program for sanitary sewers which is actively applied to industries. Local municipalities are responsible for controlling discharges to storm sewers. To a certain extent, efforts by the local municipality towards industrial enforcement, albeit for storm sewers, may be viewed as overlapping with the regional program for sanitary sewers.

### DURHAM

The Town of Pickering has indicated that the Sewer Use By-law is not part of the Town's responsibilities.

The Region of Durham has an active program for enforcement of the Sewer Use By-law. The budget for 1988 was approximately \$136,000 with an additional \$21,000 apportioned for operating and maintenance costs. The program's priority has risen from medium in 1988 to high in 1989. This change in priority likely arises from the perceived impact of the MOE's Municipal Industrial Strategy for Abatement (MISA).

### METRO

Currently, responsibility for enforcing the sewer use by-law is shared between Metro and the local municipalities. Metro enforces the by-law with respect to industries discharging to sanitary sewers. Industries are classified on their potential for causing problems in sewers and the sewage treatment plant, as follows:

high potential - firms handling corrosive or toxic chemicals; e.g. metal finishers, paint manufacturers, together with previous offenders.

medium potential - firms with processes likely to cause a problem in the sewer or at the sewage treatment plant; e.g. food processing industries.

low potential - firms whose processes and operations are unlikely to cause problems.

High potential firms are sampled at least 8 times per year plus one plant inspection. Medium potential firms are sampled at least twice per year plus one plant inspection. Low potential firms are inspected without notice, with an optional sample, at least once every two years. The inspection includes a visit to the premises during which a detailed inspection of all

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pipng, plumbing and drainage connections is carried out. In 1988 Metro inspected a total of 428 industries; this figure is expected to increase to over 500 in 1989. In 1988, Metro identified 44 industries with effluent exceeding its bylaw requirements. Expenditure for 1988 was \$863,000 and 1989 will see a slight increase in budget to cover two additional staff.

Local municipalities are responsible for regulating discharges to storm sewers. East York does not actively enforce the by-law. There have been few complaints in the past and as a result enforcement has been given a low priority.

Etobicoke has approximately 2000 industries under its jurisdiction of which 50 have been identified as potential offenders. These fifty are checked for pH only, on a monthly basis. Additional inspections raise the number of industries monitored annually to 200.

Scarborough operates a well organized program which combines sewer use inspections with spill control prevention, tracing and disconnecting illegal connections to storm sewers, and removal of storm connections to the sanitary. The program is proactive, involving municipal staff working with industry to prevent future problems. In this respect the Scarborough program is the closest approach, by a local municipality, to the type of program described in the revised model sewer use by-law. Progress is viewed as good due to co-operation by owners; there have been no prosecutions in the past 3 years. The main impediments, apart from resources, have been identified as access to property and split jurisdictions in relation to process piping, drainage piping and sewer connection, i.e. sanitary sewers and storm sewers have different jurisdictions.

North York's emphasis in sewer use by-law enforcement is directed towards finding and removing illegal sources of storm water from the sanitary systems. North York spent \$700,000 in 1988 towards the enforcement of the by-law. Funding from the MOE amounted to \$350,000. About eight to ten percent of industrial connections are inspected annually. The main impediment encountered is access to property which the City believes could be overcome by firmer legislation.

The City of York funds by-law enforcement from its overall operations and maintenance budget. No data was available for determining the program's effectiveness. The program has a low priority with progress seen as poor, generally because of inadequate funding.

### PEEL

Sewer use by-laws are both Regional and local municipality concerns. Regulation of sanitary sewers is the responsibility of the Region; regulation of storm sewers is the responsibility of the local municipalities. The Region of Peel (Public Works Department) spent \$860,000 in 1988 including 12 person years of staff time. The City of Mississauga spent about \$70,000 in 1988 including 1.5 person years.

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Sewer use by-laws have been identified as a higher priority in the future. In terms of dollars alone, the Region will spend \$1,100,000 in 1989 and the City of Mississauga almost \$200,000 in 1989. Of the 7800 industries in the Region, all are inspected yearly. In 1988, 150 infringements of the by-law were identified and all are now being addressed. 1200 random test samples were taken in 1988 and 2500 are proposed for 1989. Local municipalities are not required to inspect industries.

Within the Region's by-laws, there is provision for surcharges to the sewer system for treatable wastes.

MISA is expected to affect the existing programs. However, the Region felt that authority to disconnect sewer systems is required to ensure complete compliance.

Local municipalities have expressed concern over the allocation of responsibility. It was indicated that perhaps the Region should be responsible for both sanitary and storm sewers. The reasoning was that the Region already had a good enforcement program and they would only need to expand their existing facilities.

### YORK

Sewer use by-laws are currently enforced by the Region's Engineering Department. \$60,000 was budgeted in 1988 with one full-time person assigned to the program. Of the 2500 non-residential sewer connections in the Region, 350 were sampled in 1988. None of the local municipalities in the Region have reported an active program related to sewer use by-laws.

### SUMMARY

The current programs are strongly oriented towards the control of industrial discharge to the sanitary sewer which is a regional responsibility. The 1988 spending levels by region are shown below:

Durham	158,000
Metro	863,000
Peel	860,180
York	60,000
-----	
Total	1,941,000

Enforcement of storm water aspects of sewer use by-laws is not nearly as comprehensive. Local municipalities are responsible for this area. The level of enforcement ranges from none to a fairly comprehensive, proactive program.

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### Potential Program Improvements

The enforcement of sewer use by-laws is generally considered to be an important program by the Regional municipalities. Local municipalities vary in their use of these by-laws, and tend to emphasize the portions of the by-laws which address specific problems specific to their jurisdiction. Comments received from Regional municipalities indicate that although staffing levels are increasing, the availability of sufficient numbers of trained and equipped staff, together with necessary resources (including lab capability) remains the principal impediment to more effective program delivery. Local municipalities tend to point to problems of internal jurisdiction (works versus building departments), owner cooperation, and in some cases, lack of local priority, as the major impediments.

The area of sewer use by-laws has perhaps the greatest potential for change in the near future because of the implementation of the MISA regulations. These regulations will bring a standardization to municipal sewer use enforcement. All improvements at this stage must be considered interim and should be judged, not just in terms of their current cost-effectiveness and benefits, but also on their projected compatibility with the MISA requirements.

The potential program improvements considered in the following sections therefore concentrate on either the expansion of resources (which will ultimately be of use under MISA) or elements of sewer use control which are not emphasized within MISA.

#### **A. Increase Regional Resources Dedicated to Existing Sewer Use Enforcement**

There would appear to be a shared or overlapping responsibility between the regional and local municipalities. Generally, the regional municipality has a more developed program for sanitary sewers which is actively applied to industries. Local municipalities are responsible for controlling discharges to storm sewers. To a certain extent, efforts by the local municipality towards industrial enforcement, albeit for storm sewers, may be viewed as overlapping with the regional program for sanitary sewers.

Metro Toronto appears to have the an efficient (sanitary) sewer use control program based on different criteria: number of industries sampled; frequency of sampling; number of prosecutions; and expenditures per capita. Peel and Durham Regions also have noteworthy programs. Peel's program entails annual sampling of all industries, which is the preferred approach cited by many municipal representatives. Over 10,000 industries have been reported in the four Regional Municipalities.

Metro, Peel, and Durham appear to have programs which adequately address sewer use enforcement. The programs are limited primarily by the resources available. If more staff are provided, then a larger number of industries will be checked at a higher frequency. As an interim measure, an increase in the resources available for existing programs is the best course of action. Greater conformity in enforcement application will ensue from the MISA

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regulations and efforts at this stage to alter existing programs prior to MISA implementation would likely lead to a negative rather than positive results.

In the case of the Region of York, it appears that this region lags the others in the level of resources applied under existing conditions. In suggesting an increase in resources applied to sewer use enforcement across the regions, the need for York to "catch up" has to be recognized.

In addition to staff resources, a corresponding increase in resources for lab facilities and analysis, equipment, vehicles and training would be necessary. For the purposes of discussion during the option selection phase of the RAP, an increase in the staff assigned to sewer use enforcement of approximately 50% is postulated, except in the Region of York where a larger increase is projected. The estimated costs of this level of enhancement to existing programs is provided below.

<u>Estimated Costs for Providing Increased Enforcement of Existing Regional Sewer Use By-Laws</u>						
Region	Number of Industries	Current Staff (PY)	Budget (\$1000)	Proposed Staff (PY)	Budget (\$1000)	Increased Cost (\$1000)
Durham	543	3.4	158	5	225	67
Peel	2305	12.0	860	18	1,112	252
Metro	5872	18.0	863	27	1,241	378
York	1589	1.0	60	6	270	210
Total	10,309	34.4	1,941	56	2,848	907

Note: Costs estimated based on \$35 K/PY and a 20% allowance for equipment, lab analysis, etc.

The postulated increase in staff resources would provide for improved execution of existing municipal programs for sewer use control. The additional staff will be necessary in order to implement the MISA Sewer Use Regulations in the future. By committing staff resources at this time, training can be provided while increasing the number of industries inspected and sampled on an annual basis.

### **B. Establish Resource Commitment to Sewer Use Enforcement Among Local Municipalities**

Local municipalities are generally responsible for addressing discharge to storm sewer systems under the various sewer use by-laws in place. Only Scarborough and Mississauga appear to operate more than nominal programs of enforcement in this regard. North York operates a significant program aimed at eliminating illegal storm connections to the sanitary sewer, but does not seek to enforce the quality of discharge to storm sewers. Many municipalities do respond to problems such as spills or dumping, which are closely related to sewer use enforcement, but these are generally reactive rather than proactive responses.

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There remains some question as to who will be responsible for storm sewers under the MISA program. The requirements for sampling and development for best management practices (BMPs) plans for industries suggest that a regional level of responsibility may be most appropriate. The strong ties between a local municipality and its industries however, and the logical tie-ins with other local programs such as spill control and cross connection tracing argue for a local level of responsibility.

As an interim measure, pending implementation of MISA, a potential improvement would be for all local municipalities to adopt a proactive approach to industries within their jurisdiction, such as that practised by Scarborough. This would require designated staff who would visit local industries, to raise their awareness of the importance of good housekeeping practices. The staff would also develop a good working knowledge of the products and processes used in specific industries. This knowledge would assist the municipality when responding to unreported spills and dumping incidents.

The projected staff requirements for local municipalities to set up an interim program for storm sewer control is provided below. In general a single staff resource is required as a minimum to ensure that the program priority is not lost in day to day operations. Larger municipalities with more industries would require more staff. The smaller municipalities can not support a dedicated staff resource for such a program and in any event they have few industrial connections. It has been assumed that regional resources would address storm sewer concerns in Pickering, King, Richmond Hill, Whitchurch-Stouffville and Caledon.

Estimated Costs to Implement an Interim Storm Sewer Control Program

Municipality	Population	Staff Required	Annual Cost
Brampton	188,000	1	40
Mississauga	372,000	2	10
Markham	114,000	1	40
Vaughan	65,000	1	40
East York	101,000	1	40
Etobicoke	308,000	2	80
North York	554,000	2	80
Scarborough	483,000	2	0
Toronto	608,000	2	80
York	135,000	1	40
Total		15	450

Note: Costs in \$1000's; Scarborough and Mississauga costs reflect current staffing

### **C. Adopt and Implement Model Sewer Use By-Law in Its Entirety**

The highest level of improvement which can be expected prior to the implementation of the MISA program would entail complete adoption of the revised Model Sewer Use By-Law by

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all municipalities. The model by-law was developed with the knowledge that MISA would come into force within a short period of time, and it was therefore written to bridge the gap between existing municipal practice and the projected MISA requirements. Adoption and implementation of the by-law would allow an increased effort in field investigations, training of staff, and development of necessary support capabilities such as computer software and reporting procedures. It would also lead to increased industrial awareness and would likely reduce the transition problems which may be expected when the MISA regulations come into place.

The intent of adopting this approach would to first increase the staff available for enforcement, and second to begin implementing the procedures which are not currently a common practice among the municipalities. In this regard, municipal work on the development of waste survey reports and industrial best management plans will improve existing programs while laying the ground work for implementation of MISA.

Projected cost estimates for adoption and implementation of the model by-law are based on cost estimated for the MISA program. While the specific costs of this program will vary by municipality, depending on their current programs, it is expected that capital costs will average \$2/capital and annual operating costs will average \$3/capita. Since the capital costs are based primarily upon the need to expand laboratory facilities and purchase sampling equipment. Annual operating costs reflect primarily staff costs.

As an interim program, it is not expected that the full costs associated with MISA would be required. For the purposes of this estimate it has been assumed that the total commitment would represent 50% of the expected MISA costs. The costs have been allocated on a two-thirds/one-third basis between regional and local municipalities, recognizing the greater regional responsibility for sewer use control. The projected costs for this option are shown below.

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### Estimated Costs for Implementation of the Model Sewer Use By-Law

MUNICIPALITY	POPULATION (1985)	CAPITAL (\$1000)	COSTS ANNUAL (\$1000)
<b>REGIONS</b>			
Durham	325,000	217	325
Metro	2,183,000	1,456	2,183
Peel	590,000	394	590
York	349,000	233	349
Subtotal		2,300	3,447
<b>LOCAL</b>			
Pickering	45,758	15	23
East York	97,679	33	49
Etobicoke	298,490	99	149
North York	556,308	185	278
Scarborough	461,957	154	231
Toronto	606,247	202	303
York	33,856	11	17
Brampton	177,675	59	89
Caledon	28,701	10	14
Mississauga	359,495	120	180
King	15,733	5	8
Markham	105,341	35	53
Richmond Hill	44,358	15	22
Vaughan	56,766	19	28
Whitchurch	14,453	5	7
Subtotal		967	1,451
Total		3,267	4,898

### Potential Program Benefits

Sewer use control programs are correctly perceived as being effective in environmental protection although quantifiable data are not available to relate these controls to water quality improvements. Sewer use controls are acknowledged as having beneficial water quality effects in the following areas:

prevent sanitary sewer and sewage treatment plant malfunctions and spillage to receiving waters;

reduced concentrations of industrial wastes from sanitary sewers and combined sewers being carried to receiving waters during wet weather;

reduced amounts of industrial wastes to the treatment plant and subsequently to receiving waters;

improved stormwater quality runoff from storm sewers through on-site industrial stormwater quality controls.

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The sewer use control programs encourage control at source through the limits set on discharge to the sewers and the prohibition of discharge of persistent toxic substances.

### Dependent Projects

Implementation of the improvements to sewer use control programs are not dependent upon other projects considered in the RAP. There are strong linkages with other municipal enforcement programs including spills control and cross connection tracing. In addition, the MISA Sewer Use Program, will have a major effect on individual municipal sewer use programs ensuring a consistent and mandatory enforcement of sewer use control.

The sewer use control programs and MISA are expected to have a major impact on the performance of municipal sewage treatment plants. Reduction at source, as a consequence of more stringent requirements for sewer discharge, will reduce the toxic load to the plants and the pass-through of contaminants to the Lake.

### Monitoring Requirements

Ambient monitoring is not a requirement of the sewer use control program. Experience has shown however that end of pipe monitoring is a useful means of auditing the effectiveness of the programs, especially for storm sewer discharge. End of monitoring, as recommended under the cross connection tracing program should receive special emphasis, particularly in industrial catchments.

Waterfront ambient monitoring, especially in the vicinity of the sewage treatment plants will be a general require of the RAP. The results of the monitoring studies will be used to judge the overall impact of sewer use control programs and to determine if further reductions in discharge limits are required.

### Reporting

Comprehensive reporting require will be instituted under the MISA program. For the purposes of the interim measures discussed in this section, reporting should consist of:

- annual expenditure/staff allocations
- progress in terms of industries inspected, violations recorded, actions taken

### Implementation

The speed at which the different levels of improvements can be implemented depend upon the option(s) selected. Option A is based on increased staffing to already strong programs in

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some of the regional municipalities. Implementation should only require funding approval, prior to commencement. Option B requires implementation of programs that do not exist at present except among a few of the local municipalities. It is anticipated that this option could require an additional year to implement.

Option C would require municipal adoption of the model sewer use by-law. While this is in progress in some of the regional municipalities it is likely that a year will be required before implementation would be possible in all municipalities.

One major impediment to implementation for all of these options is the availability of trained staff. Several of the regional municipalities have been increasing staff levels over the past several years and have noted difficulties in hiring personnel with experience. This problem will likely increase as more municipalities increase the demand. Training programs, to be provided by the Ministry of the Environment as a lead-in to MISA will be required to compensate for the lack of trained and experienced individuals.

### Potential Delays

The most likely cause for delay in implementing these options will be municipal reluctance to take steps and commit funds in advance of the MISA regulations. Uncertainty and the time required to hire and train staff will make deferring decisions a defensible position.

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### Summary Information for Implementation

Component Action:	Sewer Use By-Laws
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	MISA STP Improvements Spill control Cross Connection Tracing
Implementation Responsibility:	Regional/Local Municipalities
Funding Responsibility:	Municipal
Additional Costs Range:	\$0.45-4.9 M (annually)
Monitoring Requirements	End-of-Pipe Auditing
Reporting Requirements:	Staff/Resources Industries Inspected Violations Recorded Actions taken
Timeframe:	1 year
Potential for Delay	high
Potential Reasons for Delay	await MISA regs

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### Reference Documents

Metro Toronto Remedial Action Plan : Documentation of Current Remedial Programs  
R.V. Anderson Ltd., 1989  
Model Sewer Use By-Law; Environment Ontario, August 1988.  
Controlling Industrial Discharges to Sewers; Environment Ontario, September 1988.

### REMEDIAL ACTION # 2.3:

### Implement MISA Municipal Regulations

The MISA Municipal program is currently under review. Efforts will be made to gather the most current information for inclusion in the discussions leading to option selection.

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REMEDIAL INTENT #3

REDUCE THE IMPACTS OF DRY WEATHER SOURCES

Summary of the Problem

Dry weather discharge is associated primarily with storm sewers. Many storm sewers discharge continuously because of infiltration (ground water seeping into the pipes). The water is often contaminated by accidental or intentional discharges from other sources as a result of cross connections, spills, and poor handling practices in both industrial and residential areas. Outside of the urban area, agricultural activities contribute to dry weather loading of bacteria, nutrients, herbicides and pesticides.

Residential cross connections which can produce dry weather bacteria loads are discussed under Remedial Action 2.2 because they are a sanitary sewage source. All other dry weather source problems are discussed in the following sections.

**REMEDIAL ACTION # 3.1**

Reduce Loads From Industrial Dry Weather Sources

Industrial areas are often significant contributors of dry weather chemical loadings. Contamination can be continuous, as a result of inappropriate connections to storm sewers or intermittent, as a result of poor handling practices and spills. In either case, the impact can be severe, especially when the storm sewer discharge is to a river. Under low flow conditions there is little opportunity for dilution to reduce chemical toxicity.

Programs aimed at reducing industrial sources of dry weather contamination must involve municipal enforcement and education. Municipalities have been increasing enforcement in recent years, and in some, efforts at educating industries have also been increased. Most of the component actions listed below are also addressed under the Model Sewer Use By-Law and the MISA Sewer Use Control Program (Component Actions 2.2.3 and 2.2.4). Voluntary adoption of the by-law or alternately the regulatory requirements of MISA will provide support to these actions in the future.

**COMPONENT ACTION # 3.1.1:**

Trace and Disconnect Industrial Cross Connections

A cross connection usually involves a connection of a domestic discharge to the storm sewer rather than the sanitary sewer. While cross connections are most prevalent in residential areas, cross connections also exist in industrial areas. As is the case with residential cross connections, an unknown or inadvertent connection to the storm sewer system is often the fault. The problem is prevalent in industrial mall settings where frequent changes in ownership lead to plumbing changes.

The recently revised Model Sewer Use By-Law produced by Environment Ontario has provisions for inspection, sampling, and development of waste inventories which will assist

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municipalities in locating industrial cross connections. Implementation of this model by-law is voluntary at present, and the main impediment to effective implementation is a lack of municipal staff to conduct inspections. The provisions in the model by-law will form the basis for the Sewer Use Control Program which is being formulated under MISA. Once the MISA program is in effect, enforcement will be mandatory.

Under TAWMS and WWQIP, storm sewer outfalls were prioritized on the basis of chemical contamination. Until recently, little remedial action had been undertaken because efforts have concentrated on the bacterial problem. The responsibility for action within Metropolitan Toronto lies with Metro, in so far as tracing the sources of chemically contaminated sewers is concerned. Once an offending connection is traced, correction is usually initiated by the industry under the direction of the local municipality. Under most existing by-laws, the local municipality is responsible for storm sewers.

### Existing Programs

In general, the only program to identify industrial cross connections based on an end-of-pipe audit, exists in Metro. Metro and the other Regional municipalities conduct industrial inspections under their sewer use control programs (Component Action 2.2.4). The sewer use inspections tend to be oriented towards discharges to the sanitary and do not provide a receiving water based check on the sewer systems.

The program conducted by Metro began in 1988 in response to the dry weather sampling and designation of chemical priority outfalls. The program operation on the Humber was very successful in comparison to the trace and disconnect programs aimed at residential connections. A summary of the results of the program is given below.

- Thirty priority outfalls visited; 28 were active; Sampling initiated
- 194 samples collected, including 59 related to source tracing
- 14 outfalls were contaminated enough to require intensive tracing
- 8 industrial cross connections were found; 6 have been corrected; 2 in progress
- 16 industries and 2 commercial establishments were found to have spillage or poor housekeeping practices; Management informed and corrective action taken at 16 locations; 2 more have work in progress
- 4 outfalls designated under TAWMS were tested for PCB contamination; results negative
- 3 industries were charged by MOE; 2 were convicted with fines totalling \$31 K; remaining case is pending
- 3 industries were charged and convicted by Metro with fines of \$4.25 K

The 1988 program on the Humber River was conducted at a cost of \$75.5 K, 50% percent of which was provided by MOE under the WWQIP program.

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A similar program was conducted in 1989, focusing on the Don River but including follow-up work on the Humber, at an estimated cost of \$ 140 K. The results of this program are provided below.

- Thirty-four priority outfalls visited; 31 were active; Sampling initiated
- 208 samples collected, including 60 related to source tracing
- 10 outfalls were contaminated enough to require intensive tracing
- 13 industrial cross connections were found; 8 have been corrected; 5 in progress
- 9 industries and 5 commercial establishments were found to have spillage or poor housekeeping practices; Management informed and corrective action taken at 14 locations
- 111 outfalls on Massey/Taylor Creek and the lakefront were monitored for bacteria; 663 samples collected
- 4 industries were charged by Metro; court action is pending

A proposal for continuation of the program in 1990 has been submitted to WWQIP for funding approval. The 1990 program would involve follow-up work on the Don and Humber rivers as well as initiation of work on Mimico Creek, Highland Creek, and the Rouge River. The estimated cost for the 1990 program is \$ 266 K.

### Potential Program Improvements

The existing program conducted by Metro, is part of the abatement activities conducted under TAWMS, in response to a sewer outfall sampling and prioritization study. It has no equivalent in the Regions outside of Metro. Industrial cross connections are typically sought through industry oriented inspections under the sewer use by-law programs (Component Action 2.2.4) or as a result of continuing reports of problems such as unreported spills. It is expected that implementation of the MISA Sewer Use Control Program (Component Action 2.2.3) or as an interim measure, the revised Model Sewer Use By-Law, will lead to significant improvements regarding industrial cross connections. In addition, elements of these programs, discussed under Industrial Best Management Practices (Component Action 3.1.3) will serve to raise worker and management awareness which will lead to reductions in the number of incorrect connections made.

None of these programs however, will provide a receiving water or end-of-pipe audit on the effectiveness of the initiatives.

### **A. Extend Industrial Trace and Disconnect Programs Based on End-of-Pipe Sampling to The Regions and Areas of Metro not yet Completed**

Metro has completed a trace and disconnect program on the Humber River within Metro and is in the process of completing a similar program for the Don River. It is anticipated that action under the Model Sewer Use By-Law (Component Action 2.2.4) or the MISA Sewer Use Control Program (component Action 2.2.3) will lead to on-site detection of illegal

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industrial cross connections. The relative efficiency of the actions taken by Metro on the Humber suggest that, at least in the short term, end-of-pipe oriented trace and disconnect programs may be worth pursuing.

A prerequisite of this action is the determination of priority outfalls within each municipality. This has been completed for the entire Don River and for the watersheds of the Humber, Mimico, Highland and the Rouge, within Metro. Sampling studies for Etobicoke Creek, and the portions of these watersheds in the Regions of Durham, York and Peel would be required before tracing can be undertaken in these areas. The costs for establishing priority outfalls are provided under Component Action 2.2.2, Improvement C. The total cost for outfall prioritization, excluding Metro municipalities is approximately \$1.3 million. If Improvement C is not selected for implementation these costs would accrue to this action.

Once the outfalls have been prioritized, tracing up the pipe, locating the cross connection, and requiring its removal would be undertaken by the Regional municipalities. Based on the work conducted by Metro, a three man crew operating for nine months, could complete approximately 15 priority sewers. The cost associated with this work was approximately \$100 K for staff and equipment. No analytical costs were noted as Metro internalized these costs under other programs. Assuming a unit cost of \$250/analysis and noting that about 200 samples were collected, a unit cost of \$3500/priority outfall has been derived for analysis costs.

A potential program to trace and disconnect industrial cross connections is presented below. Each Regional municipality would hire one crew and conduct the program at selected priority outfalls. The proposed Metro program for 1990 calls for expansion of the number of crews from one to two, with additional supervisory staff and it has been assumed that this program will be approved. The program would involve progressive tracing up the pipe until cross connections were found.

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**Estimated Costs For Industrial Trace and Disconnect Program**

<u>Municipality</u>	<u>Priority Outfalls</u>	<u>Lab Costs</u>	<u>Staff Costs</u>	<u>Total Cost</u>
Durham	1	3,500	100000	103,500
Metro	27	94,500	250000	344,500
Peel	12	42,000	100000	142,000
York	6	21,000	100000	121,000
Total	46	161,000	550,000	711,000

Notes: 1. Priority outfalls estimated as 1% of total estimated number of outfalls.  
2. Lab costs based \$3500/outfall.  
3. Staff costs based on Metro experience on the Humber River and include equipment etc. Staff costs for Durham include use of staff outside the RAP area.  
4. Costs do not include initial costs of prioritization.

Under current funding programs, the MOE would subsidize up to 50% of the Metro program (@ \$ 125 K), exclusive of lab costs, through the WWQIP program. The WWQIP program does not apply to the other Regions and costs would be the responsibility of the Regional Municipality.

It is anticipated that this potential improvement, if undertaken, would be a one time undertaking. The inspections conducted in future under the MISA sewer use program are expected to eliminate the need for such programs. The timeframe for completion of these programs would therefore be within the next 5 years. It is noteworthy that MISA will be coming into force within the next 3 years and it may take nearly that long for priority sewers to be determined in areas which have not been sampled.

**B. Conduct End-of-Pipe Audit Sampling for Selected Industrial Outfalls**

As an alternative to the program discussed above, a sampling program, conducted by the Regional Municipalities and oriented towards a prioritized set of outfalls draining predominantly industrial areas could provide useful enforcement information, especially if used in conjunction with information from the Waste Survey Reports required by the revised Model Sewer Use By-Law. The selection of a set of priority outfalls would be done on either a percentage of land use basis or as a result of testing conducted as one of the improvements to Component Action 2.2.2. It is therefore anticipated that there would be no additional cost associated with the selection of a set of priority outfalls. Costs for actual operation of the audit program will vary by municipality, depending on the number of priority outfalls

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involved. The projected costs provided below assume quarterly sampling for a series of metals and organic chemicals. In practice, the analyses would be tailored to match the industries present in the sewershed and would be revised on a continuing basis to reflect previous analytical results. Staff costs represent an allowance only and assume that the end-of-pipe audit would be conducted in conjunction with other sewer use control activities and therefore a full time crew would not be required in most instances.

The main difference between this and Improvement A is that efforts would concentrate on the point of discharge and would not involve tracing up the pipe. Site inspections conducted under other programs would be expected to locate the cross connections.

### Estimated Costs For Regional End-of-Pipe Audit

<u>Municipality</u>	<u>Priority Outfalls</u>	<u>Lab Costs</u>	<u>Staff Costs</u>	<u>Total Cost</u>
Durham	1	3,000	0	3,000
Metro	27	81,000	75000	156,000
Peel	12	36,000	30000	66,000
York	6	18,000	15000	33,000
Total	46	138,000	120,000	258,000

Notes: 1. Priority outfalls estimated as 1% of total estimated number of outfalls.  
2. Lab costs based 4 samples at \$750/sample.  
3. Staff costs based on Metro experience on the Humber River and include equipment etc. Costs extrapolated to other municipalities base on number of outfalls.

The effectiveness of this kind of program improvement will vary from outfall to outfall and there may be difficulties in interpreting results for the following reasons:

a) few catchments are entirely industrial; since many chemicals which could originate in industry could also be discharged through improper domestic disposal, it may be difficult to deduce specific source problems unless the chemical detected is characteristic of a specific type of industry or it is detected in quantities which preclude domestic origin.

b) comparison of results to the chemical limits for discharge to storm sewers contained in the revised Model Sewer Use By-Law will not be meaningful because these limits have been set sufficiently low that normal uncontaminated runoff will often exceed

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them. Municipalities will have to develop their own criteria based on experience to judge the results of the audit results.

### **C. Develop Automatic Sample Collection Systems for End-of-Pipe Audit**

An alternative to fixed station audits of specific outfalls would involve placement of automatic sampling equipment at priority outfalls on a random rotating basis. Systems are available which are flow actuated and it would be possible to collect samples only when an unusual increase in discharge occurred. In addition, field tested chemical analysis kits are available which could be used to give a gross estimate of the contaminants present, thereby providing early warning for follow-up action, or an indication of whether a more detailed and expensive analysis is warranted.

Much of the required equipment will be available within municipalities as a result of monitoring requirements of MISA, but it is likely that scheduling the use of equipment for end-of-pipe audits will be given a low priority because this type of sampling would not be a regulatory requirement. The required equipment is also available through the Ministry of the Environment as a result of MISA development and future provincial auditing requirements. It is anticipated that use of Ministry equipment by either consultants hired for the purpose or dedicated MOE staff would provide the most efficient use of resources.

The Ministry conducted a dry weather contaminants study, using consultants during 1988 and 1989 (Component Action 7.1.1). Based on this study it is estimated that an end-of-pipe audit using automatic equipment could be conducted for approximately 50 outfalls for about \$200,000 using consultant staff and outside laboratory facilities. If the same program was to be conducted by dedicated Ministry staff it is anticipated that the an additional staff allocation of 2 person years would be required. The costs of a program using consultants or Ministry staff are comparable, but the latter is preferred because of the consistency and experience gained over time. An allowance for equipment replacement and updating of \$35 K/year may be anticipated. Total cost would therefore be approximately \$235 K/year for either a consultant or Ministry operated program.

#### Potential Program Benefits

The main benefit to each of the improvements would be to provide a check on the effectiveness of other programs such as by-law enforcement and spills control. With sampling being conducted at the receiver, a truer representation of the benefits and environmental consequences of a given level of action will be provided. In addition, the results of sampling, used in conjunction with waste survey reports, will provide a basis for auditing and spot checks of industry as required under the MISA sewer use program.

#### Dependent Projects

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No projects discussed elsewhere in the RAP are dependent upon this component action. The costs presented for Improvement A are dependent upon the sampling discussed as part of Improvement C of Component Action 2.2.2 (outfall prioritization in the Regions). It is anticipated that implementation of the Component Action would be facilitated by the improvements discussed in regard to sampling programs for Component Action 2.2.2 (Trace and Disconnect Sanitary Connections to the Storm Sewers). Costs could possibly be reduced by combining the two programs. Implementation of various other programs involving spill control, by-law enforcement, and industrial best management practices, would be facilitated by the implementation of this type of program.

### Monitoring Requirements

Not applicable.

### Reporting

Reporting would be dependent upon the agency responsible for conducting the program. In either case the reporting should consist of an annual listing of the outfalls sampled, the analytical results and any actions undertaken or recommended.

### Implementation

Implementation should be possible within a relatively short timeframe. In general all that is required is approval of funds to hire staff and laboratory services. Selection of priority outfalls in the Regional municipalities outside of Metro may delay implementation in these areas.

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### Potential Delays

None anticipated.

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### Summary Information for Implementation

Component Action:	Illegal Industrial Connections
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Illegal Domestic Connections Sewer Use By-Law MISA Sewer Use Program Spills Control
Implementation Responsibility:	Regions/MOE
Funding Responsibility:	Regions/MOE
Additional Costs Range:	Opt. A - \$0.46 M over 5 years Plus \$1.3 M over 2 years (if outfall prioritization req'd) Opt. B&C - \$.25 M annually
Monitoring Requirements	No extra requirements
Reporting Requirements:	yes; monitoring results, progress
Timeframe:	1-2 years for initiation
Potential for Delay	Only for option A
Potential Reasons for Delay	Need to conduct outfall sampling first

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### COMPONENT ACTION # 3.1.2: Improve Spills Response and Prevention

Process upsets in industries and accidents on our streets can result in spills of chemicals to storm sewer systems. Legislation currently requires the reporting of spills. Environment Ontario operates the Spills Action Centre (SAC) which coordinates the response to spills through Metro and the local municipalities.

Local municipal crews or fire departments conduct the clean-up when the responsible party is unable. The party causing the spill is responsible for the clean-up costs. The majority of

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spills occurring within the RAP study area are small, in the order of a few gallons, and usually involve gasoline (from automobile accidents).

In the past, the response to spills, especially in the case of accidents on roads, has been governed by the need to protect the public. The normal response was to flush the spill down the storm sewers. While public safety remains an over-riding concern, the local municipalities have been working with the fire departments with the aim of first containing the spill and then cleaning up in a manner which reduces the discharge to the storm sewers.

### Existing Programs

The programs currently in existence are of an emergency nature; there are no municipal staff whose only job is to respond to spills. In all cases field response invariably involves the fire department which in itself is an emergency response outfit. The programs could, in a broad sense be classified into two categories: municipalities with committed resources where trained staff would be clearly identified; and those without clearly identified resources. The programs operated by Etobicoke and Scarborough within Metro, and Peel Region, are the most developed. Metro and Peel appear to be providing the most Regional support to the local municipalities.

Since specific budgets are not available in all municipalities, an estimate of current costs to respond to spills has been developed and is presented below:

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## ESTIMATED ANNUAL COSTS FOR SPILLS RESPONSE

MUNICIPALITY	PROJECTED SPILLS	LOCAL MUNICIPALITY BUDGETS \$	REGIONAL MUNICIPALITY BUDGET \$	TOTAL COST WITHIN LOCAL MUNICIPALITY	TOTAL BUDGET IN REGION
<b>DURHAM REGION</b>					
Pickering	23	6,900	5,750	12,650	
Durham Region	163	42,000 <sup>a</sup>	35,000	77,000	89,650
			40,750 <sup>b</sup>		
<b>METRO TORONTO</b>					
East York	51	15,300	12,750	28,050	
Etobicoke	151	45,300	37,750	83,050	
North York	277	83,100	69,250	152,350	
Scarborough	242	72,600	60,500	133,100	
Toronto	304	91,200	76,000	167,200	
York	68	20,400	17,000	37,400	
Metro Toronto	1,093	-	-	-	601,150
			273,250		
<b>PEEL REGION</b>					
Brampton	94	28,200	23,500	51,700	
Caledon	15	4,500	3,750	8,250	
Mississauga	186	55,800	46,500	102,300	
Peel Region	295	-	-	-	162,250
			73,750 <sup>b</sup>		
<b>YORK REGION</b>					
King	8	2,400	2,000	4,400	
Markham	57	17,100	14,250	31,350	
Richmond Hill	24	7,200	6,000	13,200	
Vaughan	33	9,900	8,250	18,150	
Whitchurch-Stouffville	8	2,400	2,000	4,400	
York Region	175 (45)	13,500 <sup>a</sup>	11,250	24,750	96,250
			43,750 <sup>b</sup>		

- a. For York and Durham these include the local municipality budgets outside the study area.
- b. Regional municipality projected budget.
- c. Spills are projected on the basis of 0.5/1000 people.
- d. Local municipality costs are projected at \$300 per spill.
- e. Regional municipality costs are projected at \$250 per spill.

It is difficult to assess the effectiveness of these spill response and control programs. All municipalities have a capability to respond to a reported spill and spills are never ignored. The results of the response action are rarely documented in terms of the impact on the ambient environment. Any documentation of a response tends to be limited to the on-site clean-up activities and actions related to public health in the immediate vicinity of the spill.

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Several impediments to effective program delivery have been identified by the municipalities. A brief description of each follows.

### (i) Prime Responsibility

It is sometimes unclear who is responsible for the clean up. In most cases four parties are involved - the originator of the spill, the local municipality, the regional municipality and the MOE. Responsibility here relates to two aspects - first, the party who is answerable for the potential harm to property, the general public and the environment? The second aspect lies in whose job it is to physically clean up the mess. The offending party does not always have the expertise or resources required and in this case who then has the prime responsibility to take charge? The roles played by the responders need to be clarified.

### (ii) Communication

For a response to be prompt and effective it is necessary to receive accurate and adequate information. There is the need to know where the spill has occurred, what and how much has been spilt, is the spill on a roadway (potential damage/entry to storm sewer) or is it directly to a watercourse and what is the recommended course of action? There is a need to establish a set procedure, perhaps in a standard format, to obtain the information required.

### (iii) Lack of current storm sewer maps, in some areas.

### (iv) The geographical size of the jurisdiction for which the response team is responsible.

It appears that in regard to the identification of the party holding prime responsibility, some clarification in the form of revised or additional legislation or perhaps clarification from the MOE is required.

The problem of communication and procedure is being addressed through the establishment of a database which will hold information on the types of industries and processes existing within the municipalities. The MOE and the four regional municipalities in the RAP study area have been involved in the development of a database referred to as the Industrial Discharge Management Information System (IDMIS). IDMIS is being developed in preparation for the MISA program. The inventory of industries and location has been completed and these data would be useful in the Spills Control Program.

In order to standardize the relay of initial information some of the municipalities have developed a form which is to be completed by the person who receives the first contact regarding a spill occurrence.

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### **Potential Improvements**

The highest level of spill response would result from providing an emergency outfit on standby, fully equipped and staffed. It is evident however, that the establishment of an Emergency Spills Response crew on standby is not economically viable and none of the municipalities have indicated an intention to proceed this way. Since the fire departments in all municipalities are already involved, the use of more emergency staff would be to some extent, redundant.

Improvements to existing programs are certainly possible. At present, however the RAP feels that it has insufficient knowledge and expertise to suggest improvements beyond increased education of staff and industry. The potential improvements listed below reflect this.

#### **A. Ensure That Each Municipality has Trained and Designated Staff Available to Respond to Spills**

As noted previously, the existing programs can be divided into two broadly defined categories. The first category would include experienced personnel who are nominated as "responders" should a spill occur. In the second category, any personnel who were available at the time would respond to the spill. A potential improvement which could be undertaken immediately would be to ensure that all municipalities upgrade themselves to the first category. Existing staff resources would be utilized as would existing training programs available through the Ministry of the Environment. Some municipalities have experienced difficulty in enrolling staff in these courses because of limits on attendance. Efforts should continue to arrange training as course openings appear. There are no additional costs associated with this improvement.

#### **B. Implement Provisions of the Revised Model Sewer Use By-Law**

Many spills which occur are accidental in nature. Dumping and poor handling practices also lead to spills, however. The best means of reducing this latter problem is through a proactive program involving industry and municipal staff. A prototype for this type of program is contained in the revised Model Sewer Use By-Law, especially those sections dealing with development of industrial management practices plans (BMPs). This improvement is discussed under Component Action 2.2.3. Costs are provided for several levels of action and range from \$0.45 to \$4.9 million annually.

#### **C. Develop a Spills Response Program for Adoption by RAP Municipalities.**

A potential improvement to existing programs would be the establishment of a standardized program which took advantage of the experience which has been gained in recent years, among both municipal and ministry staff. As part of the development of the Don River strategy, an ad hoc committee was formed to provide an assessment of spills response capability. Metro has recently established the Water Quality Implementation Coordinating

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Committee as a subcommittee of the RAP's technical advisory committee. This committee is responsible for the detailed activities needed for project implementation, within the overall RAP strategies.

One of the tasks assigned to the WQICC is continuation of work on spills response. The work of this committee should be supported, through a consultant contract, perhaps funded under the WWQIP to develop a standardized spills response program which could be used as a prototype for municipalities. The contract should consider the necessary management and reporting systems, equipment and staff requirements, and backup structural elements (eg. ponds or containment structures in high risk areas).

The cost of this option is estimated to be \$ 100 K. The Study should be completed within 1 year. The costs of implementing an improved spills response program in each municipality would not be known until completion of the study.

### Potential Program Benefits

Spills, whether accidental or intentional, represent an continuing source of toxic contamination to our rivers. While intermittent and often small in volume, occasional spills result in fish kills. Even when the effects are not immediately toxic they exert a stress on the fishery which reduces its viability and limits the species present to the more resilient varieties. Typical spills may be as toxic as a combined sewer overflow or a stormwater runoff event. Within an urban environment spills may represent a limiting factor in fisheries rehabilitation unless controls can be improved.

### Dependent Projects

No projects are dependent upon enhanced spill response directly. The effectiveness of all projects related to fisheries improvement, ranging from habitat initiatives to methods to improve water quality will depend to some extent on how well spills are controlled. A single major spill, poorly contained, could eliminate years of work on a watershed.

Several Component Actions will have an effect on the ability to reduce spills and respond to their occurrence. These include:

2.2.3 MISA Sewer Use Program

2.2.4 Sewer Use By-Law

3.1.1 Industrial Cross Connections

3.1.2 Industrial BMPs

3.2.1 Household Hazardous Contaminants

4.3.2 Pilot Stormwater Pond

5.1.2 Public Information Programs

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### Monitoring Requirements

Monitoring for spills may be best supported through the end-of-pipe audit programs outlined in Component Action 3.1.1, Improvements B and C. Research oriented towards an automatic detection system for spills is under consideration by MOE.

### Reporting

Reporting for the options provided under this action will be limited to confirmation of staff trained if option A is selected. Implementation of Option C would entail development of a detailed reporting system to augment the existing requirement under spills legislation.

### Implementation

Implementation of the options outlined in this section can be undertaken immediately, requiring only funding approval. Implementation of a standardized spills response program would be at least three years away due to the need to conduct developmental work.

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### Potential Delays

If structural controls are necessary as a back up to spills response, their construction could be delayed by environmental assessment requirements.

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### Summary Information for Implementation

Component Action:	Spills Response
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	MISA Sewer Use Sewer Use By-Law Ind. Cross Connections Industrial BMPs Household Hazardous Contaminants Pilot Stormwater Pond Public Information Programs
Implementation Responsibility:	Municipalities/MOE
Funding Responsibility:	Municipalities/MOE
Additional Costs Range:	0 - 100 K (1 year) Future cost to be determined
Monitoring Requirements	see C.A. 3.1.1
Reporting Requirements:	to be determined
Timeframe:	up to 3 years to initiate
Potential for Delay	medium
Potential Reasons for Delay	need for structural controls (Env. Assessment)

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### COMPONENT ACTION # 3.1.3: Improve Industrial Best Management Practices

Direct discharge of industrial waste to storm sewers is not permitted. Discharge of cooling water and runoff from industrial storage areas is permitted. Contaminated discharge to the storm sewers can occur from storage areas during dry weather as a result of poor handling practices (such as washing down the area). These discharges are often the result of a lack of knowledge by the employees. Because they occur irregularly, they are very difficult to trace. Industrial best management plans (BMPs) are the preferred means of limiting contamination of storm water discharged from industrial process and storage areas, as well as reducing the

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potential for dry weather dumping to the storm sewers. They are fundamental to successful application of the storm sewer sections of sewer use by-laws.

A Best Management Practices (BMP) Plan is a management tool for protecting the environment beyond the quantitative controls such as effluent limits. A BMP plan is best applied in conjunction with quantitative controls and is designed to prevent losses of contaminants to the environment such as by spills or where operating procedures play a significant role in determining contamination levels.

A BMP plan is written on a site by site basis and includes "good housekeeping" measures. The essential components of a BMP plan are written in a document by the potential polluter (e.g. the industrial discharger) and approved by the regulatory authority. It is the responsibility of the industrial discharger to implement the BMP plan.

### Existing Programs

The current practices of municipalities regarding control of industrial discharge to storm sewers are detailed as part of Component Action 2.2.4. (Sewer Use By-Law). The existing emphasis is on industrial connections to the sanitary sewer and programs in this regard account for the majority of the \$1.9 million spent annually on sewer use control programs in the Toronto RAP area. Relatively little effort is currently expended on control of discharge to the storm sewers, although some proactive programs do exist in Scarborough and Mississauga.

While municipal control and enforcement of the storm sewer sections of the existing by-laws ranges from non-existent to a quite proactive stance, in no case is there an active program which requires an industry to develop a best management practices plan. The revised Model Sewer Use By-Law does require development of such plans, if very stringent limits on discharge to storm sewers are exceeded. In practice, the storm sewer discharge limits are likely to be exceeded in runoff from any form of urban use, and so all industries are likely to be required to implement best management practices plans in the future.

### Potential Program Improvements

Full implementation of the revised sewer use by-law within the Toronto RAP area, has been projected to cost \$4.9 million annually, in addition to a capital expenditure of \$3.3 million. Interim measures involving increased staffing at regional and local levels have been projected at \$0.9 and \$0.45 million, respectively. No further resources would be required under this Component Action as implementation would result from a decision to select one of the potential improvements detailed under Component Action 2.2.4.

A single level of improvement is outlined below, documenting the elements which should be included in a BMP. The intent is to indicate the requirements for Industrial BMP

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development. The speed at which such BMPs are created will be dependent upon the staff provided for implementation.

Essential components of a BMP plan include the following:

### 1. Identification

The name and location of the facility should be clearly stated along with a statement by the plant manager that he/she has reviewed the plan.

### 2. BMP Committee

The BMP plan must describe efforts that will be undertaken to establish a BMP committee. A BMP committee is a group of individuals assigned to develop the BMP plan in much the same way that a fire prevention or safety committee develops fire prevention or safety practices. The BMP committee must develop and implement the plan, but the quality of the plan remains the responsibility of management.

The activities and responsibilities of the BMP committee must include:

- identification of toxic and hazardous materials addressed in the plan,
- identification of potential spill sources,
- establishment of incident reporting procedures,
- development of BMP inspections and records procedures,
- review of environmental incidents to determine and implement necessary changes to the BMP plan,
- coordination of incident notification, response, and clean-up procedures,
- establishment of BMP training programs for plant personnel, and
- assistance in interdepartmental coordination needed to carry out the BMP plan.

### 3. Risk Identification and Assessment

The plant areas subject to BMP requirements must be identified by the BMP committee, plant engineering group, environmental engineer or others in the plant. The potential risks of discharges of toxic pollutants and hazardous substances to storm sewers from each area must be identified. Existing physical means (e.g. dikes, diversion ditches) of controlling such discharges must be identified.

An inventory of hazardous substances and toxic chemicals must be developed as part of the risk identification and assessment. The details of this inventory should be proportional to the quantity of toxic pollutants and hazardous substances on site and their potential for reaching the storm sewer(s).

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### 4. Reporting of BMP Incidents

Spills, leaks, runoff and other improper discharges must be reported to minimize recurrence, expedite mitigation and cleanup activities, and comply with legal requirements. For this, a BMP incident reporting system must be developed and included in the BMP plan. Reporting procedures defined by the BMP committee must include:

- notification of appropriate plant personnel to begin immediate action,
- formal written reporting of BMP incidents to management for evaluation and for possible initiation of BMP changes, and
- notification, as required by law, of government and environmental agencies.

### 5. Materials Compatibility

Incompatible materials can cause equipment failure resulting from corrosion, fire or explosion. Equipment failure can be prevented by ensuring that the hazardous substances or toxic pollutants are compatible with the container contents and the surrounding environment.

Materials compatibility includes consideration of:

- compatibility of the container being stored with the container materials,
- compatibility of different chemicals upon mixing in a container, and
- compatibility of the container with its environment.

The BMP plan must list procedures for ensuring that these three compatibility concerns are considered in the design and operation of the equipment used for the storage or transfer of toxic and hazardous materials.

### 6. Good Housekeeping

Good housekeeping is the maintenance of a clean, orderly work environment and contributes to the overall facility pollution control effort. Reducing the possibility of chemicals and equipment mishandling can be accomplished by periodic training of employees in housekeeping techniques, particularly for those plant areas where the potential exists for BMP incidents.

Examples of good housekeeping include:

- neat and orderly storage of bags, drums and piles of chemicals,
- prompt cleanup of spilled liquids to prevent significant runoff to surface waters,
- sweeping, vacuuming or other cleanup of accumulations of dry chemicals as necessary to prevent them from reaching receiving waters, and
- provision for storage of containers or drums to keep them from protruding into walkways or pathways.

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### 7. Preventative Maintenance

To prevent environmental incidents, an effective preventative maintenance (PM) program is important. A PM program involves inspection and testing of plant equipment and systems to uncover conditions which could cause breakdowns and failures with resultant significant discharges of chemicals to storm sewers. The PM program should prevent breakdowns and failures by adjustment, repair or replacement of the necessary items.

A good PM program should include:

- identification of equipment or systems to which the PM program should apply,
- periodic inspections or tests of identified equipment and systems,
- appropriate adjustment, repair, or replacement of the necessary items,
- maintenance of complete PM records on the applicable equipment and systems, and
- a suitable records system for scheduling tests and inspections, recording test results and facilitating corrective action.

A plant may already have a PM program in place. However, existing programs must be reviewed and enhanced to meet the objectives of BMP for maximum environmental protection.

### 8. Inspections and Records

An inspection and records system detects and documents actual or potential BMP incidents. The BMP plan must include written inspection procedures and optimum intervals between inspections. Records to show the completion date and results of each inspection must be signed by the appropriate supervisor and maintained for a period of three years. A tracking or follow-up procedure must be instituted to assure that adequate response and corrective action have been taken. The record-keeping portion of this system can be combined with the existing spill reporting system in the plant.

The inspection and records system must include those equipment and plant areas having the potential for significant discharges. To determine the inspection frequency and inspection procedures, experienced personnel should evaluate the causes of previous incidents, the likelihood of future incidents, and assess the probable risks for incident occurrence or recurrence. Consideration should be given to the nature of chemicals handled, materials of construction, and site-specific factors including age, inspection techniques and cost effectiveness of BMPs employed.

### 9. Security

The purpose of a security system is to prevent accidental or intentional entry to a plant which might result in theft, vandalism, sabotage or other illegal or improper use of plant facilities

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that could possibly cause a BMP incident. To prevent unauthorized entry, most plants have security systems.

The BMP plan must describe the existing security system and improvements which are necessary to ensure that toxic chemicals are not discharged to storm sewers in significant quantities as a result of unauthorized entry. Separate filing, from the BMP plan, of the security system documentation may be required to prevent unauthorized individuals from gaining access to sensitive or confidential information.

### 10. Employee Training

Employee training programs must be developed to ensure that personnel at all levels of responsibility have a complete understanding of the BMP plans. Such programs should address:

- the processes and materials on the plant site,
- the practices for preventing discharges, and
- the procedures for responding properly and rapidly to toxic and hazardous materials incidents.

Meetings should be conducted at least annually to assure adequate understanding of the objectives of the BMP plan and the individual responsibilities of each employee. Typically, these must be part of routine employee meetings for safety or fire protection. Such meetings should highlight previous spill events or failures, malfunctioning equipment, and new or modified BMPs.

Training sessions must review the BMP plan and associated procedures. Just as fire drills are used to improve an employee's reaction to a fire emergency, spill or environmental incident, drills may serve to improve the employee's reactions to BMP-related incidents. Plants are encouraged to conduct spills drills on a quarterly or semi-annual basis. Spill or incident drills serve to evaluate the employee's knowledge of BMP-related procedures and are a fundamental part of employee training.

### Potential Program Benefits

Development of an industrial BMP and compliance with the plan will prevent unnecessary discharges and minimize unpreventable discharges of contaminated stormwater to storm sewers. Measures taken under the plan will address materials storage, housekeeping practices, preventative maintenance procedures, safety programs, and employee training. Adherence to best management practices will result in control at source and is consistent with the concept of sustainable development.

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### Dependent Projects

None of the other component actions are dependent upon implementation of industrial BMPs. Several component actions, including spills control would benefit from this component action however. Delays in implementing industrial BMPs will lead to a continuation of existing poor handling practices and both wet and dry weather contamination of the rivers and the lake. Resources committed to fisheries enhancement are likely to be wasted if industrial BMP programs are not pursued.

### Monitoring Requirements

See Component Action 3.1.1, potential improvements B and C.

### Reporting

Reporting initially would take the form of a simple tabulation of the progress achieved in establishing BMPs for industries in the different municipalities. As the program expands to include the majority of industries the reporting requirements may change to orient more towards incidents and efforts to prevent recurrence.

### Implementation

One of the difficulties associated with the introduction of BMPs is that they are to be developed to suit the circumstances for a particular industry. A large facility having a high potential for BMP incidents will be required to be very comprehensive, while a smaller operation may require only a simple BMP dealing with specific hazards. Municipal staff are concerned about taking the responsibility for overseeing the development and approval of BMPs because of the lack of clear standards or examples of acceptable plans. In order to remedy this, Metro Toronto and Environment Ontario's MISA Office are undertaking a pilot project in 1990 which would provide the necessary guidance and examples. The results of this project will be of use to all municipalities, both within the RAP area and in other parts of the province.

### Potential Delays

See Component Action # 2.2.3.

**Summary Information for Implementation**

Component Action:	Industrial BMPs
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	MISA Sewer Use Sewer Use By-Law Ind. Cross Connections
Implementation Responsibility:	Municipalities/MOE
Funding Responsibility:	Municipalities
Additional Costs Range:	None - see Component Action # 2.2.4
Monitoring Requirements	see C.A. 3.1.1
Reporting Requirements:	Progress on BMPs approved
Timeframe:	1990 (pilot project) 1991 (initiate)
Potential for Delay	medium
Potential Reasons for Delay	Await MISA Regulations

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**Reference Documents**

1. Model Sewer Use By-Law; Sewer Use Model By-Law Appendix/Guidance Manual; Environment Ontario, August 1988.

**REMEDIAL ACTION # 3.2**

**Reduce Loads From Residential Dry Weather Sources**

Improper handling of chemical contaminants is not a problem restricted to industry alone. Individuals regularly dispose of waste lubricating oils, paints and solvents by dumping them down basement drains and catchbasins. The main reasons for this improper handling appear to be a lack of awareness of the contamination caused and a lack of alternate disposal methods. Since many of these materials are hazardous, disposal through normal garbage pick-up is prohibited.

**COMPONENT ACTION # 3.2.1:**

**Improve Household Hazardous Contaminants Programs**

Programs aimed at residential household hazardous wastes (HHW) have been evolving rapidly over the past several years. Initially, programs took the form of collection days run by local

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municipalities. The Cities of North York, Scarborough and Toronto, ran household hazardous waste collection programs during 1986 and 1987. These programs, lasting one day, allowed residents to bring in their wastes to a central depot for subsequent sorting and disposal. The cost of these one day programs ranged from \$14000 (North York 1986) to \$96000 (Toronto, October 1987). Approximately \$270,000 was spent in total on five events in 1986-87. Environment Ontario provides a subsidy for HHW programs, but it is designed primarily to assist smaller municipalities, with a maximum contribution of \$10000/yr.

Response to the programs was variable with the North York events drawing less than 100 people and the Scarborough event drawing about 500. The cost per home serviced is about \$200. A large amount of waste was collected from the people participating (in the order of 22 kg/household in North York). About 60% of the waste collected was paint and 20% was oil.

### Existing Programs

Since 1987, responsibility for the HHW programs has tended to become vested with the regional level of government. A summary of the programs conducted in 1988 for each of the Regions within the RAP area is provided below.

#### Durham

The Region of Durham has full responsibility for this program, and has informed the public through a public notice, that household hazardous wastes could be dropped off at the Brock West Landfill Site. No charges were levied for this service. The notice also listed typical hazardous material around the house and specified restrictions on identification and container size.

Expenditure for 1988 has not been indicated. However, the Region plans to spend approximately \$60,000 on a demonstration program for household hazardous waste collection.

#### Metro Toronto

Responsibility for collection of household hazardous waste lies with Metro. The municipality accepted delivery of household wastes at various depots around Metro. The program is administered by the Refuse Division of the Works Department.

As a logical progression from HHW days, permanent depots were selected to receive such wastes to reduce hazardous materials in the residential waste stream. This is seen as an increase in the level of service, as participation by the public can be on a more regular basis. The program in 1988 made four permanent depots available for the local municipalities.

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Expenditure for the 1988 program was approximately \$200,000. A major increase in the level of service was undertaken in 1989 (see Potential Improvements).

### Peel

The Region of Peel (Waste Management Department) has a program in effect. Of the \$200,000 spent in 1988, \$10,000 was from MOE. The majority of the cost was attributed to operation and maintenance. Plans are also now being made to recycle paint waste via curbside pickup. Almost \$500,000 is budgeted for 1989. The increased spending is a direct result of a need expressed by citizens/municipalities to have an expanded program.

The program operates two days per week and averages 48 participants per week. The greater portion of materials collected are paints, acids and caustics. The program is gaining popularity as public awareness increases. This was observed as the numbers of people entering the program increased over the year.

The Region indicated that an optimum program would be one where material would be picked up by licensed haulers on a regular basis.

### York

Responsibility for this program lies with the local municipalities in the Region of York. No formal program exists, but the Metro Toronto landfill accepts hazardous waste on an individual basis. Although this option is available, it is generally regarded as a nuisance. A suggestion was made to pick-up hazardous waste during garbage collection on contractors' regular routes or the initiation of a Regional facility to handle these materials.

The quantities of residential hazardous wastes are relatively small and therefore collection and disposal is expensive. Under the program operated by Metro Toronto the program cost approximately \$ 160 per user in 1988. The unit cost has been gradually going down, but increases in the number of facilities available and other improvements to service has led to substantial increases in overall program costs. Metro alone expects to spend more than \$1 million on its program in 1989. The bulk of the costs (70%) are in the form of disposal costs, as the wastes must be disposed at a hazardous waste disposal facility.

Improvements in the handling of residential hazardous wastes depend largely on educating the public and improving the ease of access to alternate disposal sites. As higher participation rates occur, overall program costs will also rise.

### Potential Program Improvements

Metro Toronto and the Region of Peel have the most advanced HHW programs. A description of the Metro program is provided below as a possible prototype for improvement.

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In 1989, Metro expanded the number of depots accepting HHW from four to ten. It instituted a telephone hotline and a "Toxics Taxi" service on a six month trial basis. This program has recently been extended for an additional twelve months. The "taxi" service consists of a driver and chemist's assistant, trained in the handling and transport of toxic wastes, who pick up residential hazardous wastes on request. All wastes must be identified and properly packaged by residents, and they must be home to allow pick up (wastes should not be left unattended). There is a minimum quantity of 10 litres. The truck can make about 10-12 pick ups a day and operates five days a week. The service is free and available only to Metro residents.

Total Metro projects collection and disposal costs will be about \$ 450 K and \$ 720 K, respectively, in 1989. The costs of disposal only, are provided below by facility for the period ending September 16/89.

<u>Site</u>	<u>Participation</u>	<u>Disposal Cost</u>
Brock West L/F	877 vehicles	\$ 86,200
Keele Valley L/F	422 vehicles	44,600
Scarborough T/S	871 vehicles	71,500
Ingram T/S	492 vehicles	56,700
Victoria Pk T/S	221 vehicles	19,800
Commissioners St	213 vehicles	17,800
Bermondsey T/S	496 vehicles	35,800
Disco T/S	231 vehicles	12,100
Dufferin T/S	77 vehicles	0
Symes T/S	98 vehicles	6,100
Toxics Taxi	647 households	45,400
Total	4645	\$ 396,000

The collection, transport and storage (exclusive of contractor's disposal fees) are about \$145 K for one truck for the year. Metro expects that two vehicles, with crews, will be required in 1990, raising the total cost of the pick up service (including disposal) to about \$500 K/annum.

The existing program is intended to be exclusively utilized by householders and there for has the following restrictions:

- no containers larger than 20 litres
- no more than 50 litres
- no commercial or industrial wastes
- no pathological or radioactive wastes
- no PCBs or explosives
- no unidentified wastes

The majority of these restrictions are intended to ensure that businesses are not using the service. Similar services are available commercially, on a fee basis, which can be used by business. Metro has applied to amend its Certificates of Approval, in order to allow it to collect syringes and is working with MOE to finalize an operational plan and training. Metro

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is continuing to modify the service based on experience gained and random surveys of people using the service.

It appears that the program operated by Metro, or a similar program would benefit the RAP if extended to the Regions outside of Metro. Peel is upgrading the service provided, York and Durham are lagging behind.

### **A. Institute a Comprehensive HHW Program Across the Entire RAP Area**

A program such as Metro's is best operated by the regional level of government. Regions are responsible for operating landfills and waste transfer stations which are used as depots for the drop-off of HHW. Since a large portion of a "taxi" service is staff cost, duplication of effort can be reduced by making the program a regional operation, rather than one run by local municipalities.

The anticipated additional expenditures by region for providing a similar service to that provided in Metro are given below. It has been assumed that disposal costs would be proportional to population and that provision of staff and advertising of the service would cost a minimum of \$ 200K per region. The costs are for operation of a program throughout the region, not just within the RAP boundaries.

Region	1989 Budget	Projected Costs		Additional Annual Cost
		Operation	Disposal	
Durham	60 K	200 K	175 K	315 K
Metro	1170	420	720	0
Peel	490	200	195	0
York	0	200	190	390
Total	1720	1020	1280	705

The overall cost of continuing services in Metro and Peel, and expanding those in Durham and York is projected to be about \$ 2.4 million per annum. These costs would be expected to rise in future as the availability of the service becomes more well known. Already, Metro is expecting to add another crew to meet increasing demand. Efforts such as those being undertaken by Metro and Peel to bulk and recycle waste paints and oils will be required if costs are to be minimized.

### Potential Program Benefits

Programs involving collection of household hazardous wastes remove materials from the residential waste stream which would otherwise be disposed of in our landfills, sanitary and storm sewer systems. Since none these systems are designed to accommodate hazardous wastes, there are clear, if unquantifiable benefits to the collection program. The strong public support for these programs creates the added benefit of increasing awareness of environmental issues and may have long-term benefits in terms of reduction of hazardous materials in the home through product substitution.

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Beyond the intuitive and intangible benefits associated with HHW control, measurement of the success of the program will be very difficult. Although it will be possible to document the quantities of waste collected, there can be little certainty of what its impact might have been or where it might have occurred. Many wastes are simply kept by householders, others are dumped down drains leading to sanitary sewers and the treatment plants or disposed of in catchbasins leading to the rivers, while many wastes are placed in with regular domestic garbage and are landfilled. Much of the HHW collected is waste oil and paint, which is undesirable in the environment, but unlikely to cause observable impacts when released in small quantities, dispersed throughout the area, at varying times. As a result it must be accepted the cost-effectiveness of this kind of remedial effort will be impossible to establish. The question at issue is not whether HHW programs should be conducted, but rather at what point are resources better spent on other remedial measures. HHW programs have the potential to grow substantially and could overwhelm available facilities and staff resources.

### Dependent Projects

HHW programs are not dependent on any of the other component actions reported in this document. The programs parallel the component actions relating to control of industrial dry weather sources.

### Monitoring Requirements

No specific monitoring in the ambient environment is expected in relation to this component action alone. Overall RAP monitoring of contaminants in sediment and biota will provide a measure of the cumulative effect of this and other actions.

### Reporting

It is proposed that each of the regional municipalities operating HHW programs provide annual progress reports indicating the number of households serviced, the quantities and types of wastes collected, and current operating and disposal costs.

### Implementation

Implementation of expanded HHW programs in York and Durham regions should be possible within a one year timeframe, allowing for staffing, equipment purchase, advertising and securing necessary approvals. The current situation within York Region where each local municipality is considered to have responsibility is an impediment to timely implementation.

### Potential Delays

The main potential for delay will result from questions regarding cost-effectiveness. A minimum level of service should be achievable without delay.

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### Summary Information for Implementation

Component Action:	Household Hazardous Contaminants
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	None
Implementation Responsibility:	Regional Municipalities
Funding Responsibility:	Regional Municipalities
Additional Costs Range:	York Region : \$ 390 K/yr Durham Region : \$ 315 K/yr
Monitoring Requirements	None
Reporting Requirements:	Numbers of participants Quantities and types of waste Operating and Disposal costs
Timeframe:	Programs exist expand programs 1990-91
Potential for Delay	low
Potential Reasons for Delay	Cost effectiveness difficult to define

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### Reference Documents

1. Metro Toronto Remedial Action Plan : Documentation of Current Remedial Programs, R.V. Anderson Ltd., 1989.
- 2 Household Hazardous Wastes Progress Reports; various reports from the Commissioner of Works to the Metro Works Committee, Feb.-Nov. 1989.

### REMEDIAL ACTION # 3.3:      Reduce Loads From Agricultural Dry Weather Sources

For the purposes of the Remedial Action Plan, agricultural controls will refer to those measures taken to modify farm management practices in order to achieve improvements in surface water quality. These would include such things as soil conservation and runoff control measures.

The water quality impairment plainly evident along the Metro Toronto waterfront is primarily caused by source inputs within Metro Toronto. It is clear, however, that the water quality in

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the mouths of rivers entering Lake Ontario is a product of everything which occurs in the watershed; from the headwaters southward. Agricultural impacts on water quality are but one facet of the many sided problem within the RAP watershed and although the agricultural industry is diminishing within this area, the goal of ecosystem management requires that all problem sources be addressed. Agricultural activities have the potential to cause severe water quality degradation under both dry and wet weather conditions, although the most significant impacts generally occur during wet weather periods. Wet weather impacts are addressed in Remedial Intent #4.1.5.

During dry weather periods, the primary agricultural sources would include the following, without priority:

1. Direct inputs via livestock accessing the watercourse.
2. Direct inputs via improper or excessive manure spreading adjacent to watercourses.
3. Direct inputs via tiles draining milkhouse parlours.
4. Direct inputs via septic systems illegally connected to field tiles.
5. Direct inputs via improper or excessive spreading of chemical fertilizers adjacent to watercourses.

On the basis of the physiographic conditions present within the RAP watershed (soils, topography, etc.), and the type of agricultural activities occurring, the most significant form of dry weather inputs involves direct livestock access into watercourses. Milkhouse washwater may also contribute marginally to instream contamination.

Although the application of chemical fertilizers is also a known source of contamination, it is not likely that this is a significant input under dry weather conditions. While accidental spills can result in major environmental impacts, they are not considered routine and there is no information documenting their occurrence.

### COMPONENT ACTION # 3.3.1: Improve Controls on Agricultural Practices

Unrestricted access of livestock to watercourses has long been regarded as a "normal farming practice" and the impacts upon downstream water quality have only recently been quantified. Water quality impairment from cattle watering includes sediment inputs from streambank erosion as well as bacterial and nutrient enrichment from direct fecal inputs. The construction of "controlled access areas", which restrict in-stream access to a very limited area, is beneficial in reducing the amount of streambank trampling and subsequent erosion, however, recent studies suggest that downstream contamination from fecal inputs is still a concern. The best way to achieve significant reductions in fecal inputs, would be to completely fence cattle from watercourses and have livestock watering occur away from the stream.

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Although disposal of milkhouse washwater is not believed to be a significant contributor to watercourse contamination within the RAP area, it should be addressed. The common practice on Ontario dairy farms has been to discharge milkhouse wastewater through sub-surface drainage to open ditches, creeks, or streams. This is considered a "direct discharge" and is in violation of Section 16 of the Ontario Water Resources Act. Recent studies have shown this wastewater to contain excessive concentrations of phosphorus and bacteria. An average of 35 kg of phosphorus is produced annually at each dairy farm.

### Existing Programs

Within the RAP watershed, farm operators can utilize two assistance programs to construct cattle fencing: the Ministry of Agriculture and Food's Ontario Soil Conservation and Environmental Assistance Program II (OSCEPAP II) and the Conservation Authority's Land Management Program. Both of these have a fencing assistance component to encourage adoption by farm operators. Another initiative called the Rural Beaches Project has some impacts within the RAP watershed.

#### 1. Ontario Soil Conservation and Environmental Assistance Program II

It should be stated at the outset that this assistance program by the Ministry of Agriculture and Food is technically finished. While, in theory, the deadline for receipt of applications is March, 1990, in practice, the program has not been able to accept new submissions for the past several months.

The funding which was available under the OSCEPAP II Program for cattle fencing is as follows:

66% of cost to a maximum of \$10,000.00. An average farm within RAP watershed might require 100 to 200m of fence (total) @ \$9/m = \$900 to \$1800/farm.

The main intent of this component is for control of streambank erosion caused by livestock trampling and grazing.

Improvements to milkhouse washwater disposal was covered under the Environmental Protection section of OSCEPAP II at 40% to a maximum of \$7,500. The limitation on the total grant may include other work such as manure storages, barnyard improvements, and pesticide handling facilities.

There is no OMAF data available on the number of RAP watershed farmers who made use of this assistance, but it is known to be low. This is discussed further under program improvements.

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### 2. MTRCA's Conservation Land Management Program

The Conservation Land Management Program was formally adopted in 1980 and has established a number of key objectives towards improving management of land and water resources. (See Remedial Intent #5 Stream Improvement for more details). Sediment control, through livestock fencing is one component of this program. In actuality, the Conservation Authority has been involved in stream improvement initiatives since 1962, and during this period has erected some 11,000 of fencing within RAP watersheds, primarily in the middle valley areas of the Humber River. The other RAP watersheds do not have significant numbers of livestock operations. The Rouge River, the only other major rural watershed, tends to the production of row crops rather than livestock.

### 3. Rural Beaches Program

Since 1985, the Ontario Ministry of the Environment (MOE) has sponsored a program entitled The Provincial Rural Beaches Program. This initiative was prompted after an increasing number of swimming beaches were posted by the Ministry of Health in rural areas in southern Ontario. The Ministry designed the program to utilize the benefits and knowledge of local conservation authorities. Funding has been granted to conservation authorities based upon evaluations of written proposals submitted to the Provincial Rural Beaches Committee.

Since 1986, the Ministry of the Environment has provided \$225,000 in funding to The Metropolitan Toronto and Region Conservation Authority (MTRCA) to design and conduct studies on three watersheds which have suffered from swimming closures in the past. The studies are ongoing in the Centreville Creek, the East Humber River and the Bruce Creek, all located in the more rural areas of the RAP watershed.

There are significant impediments currently existing within RAP watershed which effect the use or uptake of programs by the farming community. Based upon staff observations, the following are the most significant.

#### a. **Inadequate Funding**

Program subsidies of 66% have been the traditional amount used by OMAF as an incentive to encourage use by farm operators. It is becoming clear through results from a number of Rural Beaches projects in Southern Ontario including this area, that this subsidy is not an adequate incentive to achieve the desired use of fencing for water quality improvement.

#### b. **Farming Traditions**

In the Environmental Protection Act, "normal farming practices" are exempt from legislation. Livestock watering in streams is as old as farming itself and is clearly viewed as a "normal farming practice". Limiting cattle access or removing cattle entirely from streams requires a change in attitudes.

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### c. **Inadequate Program Promotion**

The Ontario Ministry of Agriculture and Food employs Agricultural Engineers and Representatives as well as Soil Conservation Advisors to administer these programs to the farming community. This staff is responsible for the entire farming community within the Regional Municipalities of Peel and York, not just the areas within the RAP watershed. It is clear that within these municipalities, the greatest amount of farming activity occurs outside RAP boundaries and they prioritize their time accordingly. In addition, the current level of staffing promotes a reactive as opposed to a proactive approach in interacting with the community. In most situations, it is the individual farm operator who must take the initiatives to contact OMAF.

### d. **Rapid Urbanization Within RAP Watershed and Increase in Tenant Farmers**

It is clear that the economic reality of farming along the urban-rural fringe within the RAP watershed is a very significant impediment. Of the other eight Rural Beaches Programs ongoing in southern Ontario, this is the only study in which encroaching urbanization significantly impacts farming activities within the region. Since many farm operations within the RAP watershed are considered small and profit margins are low, it is not surprising that full compliance with all desirable management practices is rare. Monetary considerations are certainly an important factor in this situation. Despite the financial assistance programs which were in place, the required capital expenses are viewed as prohibitive by many operators within the RAP boundaries, especially when there is some uncertainty regarding their long term future in farming. There is obvious reluctance to invest in more elaborate manure storage facilities, for example, if the farm may be sold for development purposes.

As urbanization increases within the RAP watershed, it is likely that the numbers of tenant farmers will also rise. The recent popularity of large estate residential developments in the outlying, rural areas of the Greater Toronto Area, have unquestionably induced some operators to sell their farms earlier than anticipated. Since, in many cases, developers purchase agricultural land and lease it back to the operator, it is particularly relevant to raise the question of farm ownership. In the Conservation Authority's Rural Beaches Project, some 75% of the farms within the three study areas were operator-owned. It is uncertain how this percentage compares to the remaining areas in the RAP watershed, but tenant farmers will clearly not be interested in spending money on farm improvements, regardless of the financial incentives.

Many portions of farms have been sold for residential purposes and operate on a "hobby" basis by the resident. Hobby farms are not targeted for most programs as they are not a significant production resource, in agricultural terms. Hobby farmers are less likely to commit their share of funds for improvements such as fencing.

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### Potential Program Improvements

In view of the proceeding impediments existing within the RAP watershed, the following are Program Improvements which would assist in meeting the goal of reducing dry weather agricultural impacts.

#### **A. Develop Individual Farm Remedial Plans**

The most effective way to facilitate protection and enhancement of rural water quality is to prepare farm plans which integrate crop, soil, livestock and water management issues. Working with the farm operator will require a team approach with cooperation from a number of agencies, the MOE, OMAF, Conservation Authority, as well as agricultural organizations including the local Ontario Soil and Crop Improvement Association and the local Federation of Agriculture. Similar plans have been prepared on a local basis by Conservation Authority staff as part of the Rural Beaches Project. These plans, as mentioned, would evaluate all potential sources of contamination and would address not only the remedial measures needed, but also changes in management practices which are equally important.

These plans could be completed to some extent through the Rural Clean Water Program discussed under Improvement C. Full completion these plans throughout the RAP watershed, however, would require an additional staff resource and materials. The cost would be approximately \$70,000/annum over five years.

#### **B. Develop Improved Financial Assistance Program**

As mentioned, the most significant dry weather impacts appear to be caused by direct livestock access into streams. Ultimately, the most effective means of controlling bacterial and nutrient loadings from this source would be to restrict livestock access to watercourses within the RAP watershed.

Before providing estimates for fencing and milkhouse wastewater control discussion of the level of subsidy is warranted. As previously mentioned, the traditional subsidy has been 66% of the capital costs, up to a maximum amount depending upon the project. Through the Rural Beaches Project presently being completed by the Conservation Authority, it is clear that due to a number of factors already discussed, these subsidies have not been adequate to stimulate a high degree of program uptake.

In the Conservation Authority's Clean Up Rural Beaches (CURB) Plan to the Ministry of the Environment, a draft recommendation will be made to greatly increase subsidies from 66% to 90% and also increase the ceiling associated with these grants. This high grant rate may be justified on two counts. Firstly, as previously noted, the existing program impediments must be addressed if greater interest is to be generated in the farming community. By making it more financially acceptable, this very significant impediment may be reduced. Secondly, this grant rate would very clearly indicate the degree of urgency being placed on correcting existing problems. It seems reasonable, however, that a specific time limit be placed on the

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availability of this grant; perhaps for a period of 5 years. During this period, every effort would be made to encourage uptake. After the five year period has ended however, compliance would be enforced, without subsidy, through legislation proposed under Improvement D.

The method of achieving this level of grant support should also be discussed. If the Ministry of Agriculture and Food does establish a new grant program, it is likely that it will be a flat subsidy across the Province, and would not have the flexibility to enhance, or target specific watersheds. It is also a certainty that this flat rate will be far below 90%, and may be similar to the 66% rate currently used. From the perspective of the Metro RAP, the option would then be to provide funding to bring the grant up to the 90% level. This assumption has been employed in developing cost estimates for cattle fencing and milkhouse wastewater control.

### 1. Cattle Fencing

The following is an estimate of the costs associated with fully restricting livestock access. Caution should be exercised in reviewing these costs as they are approximations only.

The total fence length, based upon the MTRCA's Upper Humber River Livestock Study, is 35-65km (MTRCA 1986). The remaining agricultural areas within the RAP watershed is approximately double the area of the Upper Humber. Therefore:

Total livestock access is: 70 - 130km.

Fence cost is approximately \$9/m (G. Wilkins MTRCA)

Total fencing cost is: \$630,000 - \$1,170,000

Based on estimate of approximately 27,000 animal units. Nose pumps service up to 30 cattle each, therefore, there would be about 1000 nose pumps required.

Total cost of alternate water supply systems: \$1,000,000

The total costs for complete access restriction would be: \$1,630,000 - \$2,170,000

The current subsidy for farmers who wish to erect fencing and install nose pumps is 66% to a ceiling of \$10,000. The recommended subsidy for the RAP watershed would be 90 % to an increased ceiling of \$15,000. Assuming that an OMAF subsidy of 66% is available, the addition cost for implementation within the RAP area would be \$500,000 - \$665,000, over a period of 5 years.

Cattle fencing may result in loss of pasture land as the areas between the fences and the stream are no longer in production. The maintenance of these lands may also be an issue, as excessive weed growth may be considered detrimental to adjacent pasture and crop land. In addition, cattle crossings across the stream would be a necessity to provide access from one field to another. Although it is not possible to accurately estimate the costs associated with

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these issues, it is important to recognize that successful implementation may depend on resolving these points.

### 2. Milkhouse Wastewater

In assessing the importance of milkhouse wastewater the following calculations were used:

- . Estimated number of dairy operations - 220
- . Estimate milkhouse washwater disposal problem on 50% of farms.
- . Average total phosphorus input is 35 kg/farm/year

Total phosphorus into streams within RAP watershed is:

$$220 \text{ farms} \times 0.5 \text{ contamination} \times 35 \text{ kg/farm/year} = 3,850 \text{ kg TP/year.}$$

The total riverine load of Total Phosphorus (TP) contributed to the waterfront is estimated to be between 140,000 and 200,000 Kg/year.

The average price of a proper OMAF approved disposal system is \$4,000

$$\text{Total cost is: } \$4,000/\text{farm} \times 110 \text{ farms} = \$440,000$$

$$\text{Recommended subsidy: } 90\% \text{ with a ceiling of } \$5,000$$

$$\text{Total Cost: } 110 \text{ farms} \times \$3,600/\text{farm} = \$396,000$$

Assuming the availability of an OMAF subsidy of 66%, the residual cost to the RAP under this option would be approximately \$135 K.

In total, the cost of providing an enhanced subsidy under the RAP program would be \$635-800K over five years. The responsibility for funding would have to be negotiated and would likely require substantial municipal contribution, in light of the provincial subsidy already existing through OMAF.

### C. **Develop Improved Education Program (Rural Clean Water Program)**

It is clear that increased financial incentives alone will not be sufficient to encourage greater use of cattle fencing within the RAP watershed. Education is considered to be a key component. Beyond the agricultural community, there exists a greater need to increase public education and awareness throughout the rural community in general. An educational program is needed to supplement incentive and enforcement efforts. Such a program, which could be entitled "Rural Clean Water Program" would be targeted at the farming community, the general public and local municipalities. This program would provide an effective liaison between the Ontario Ministry of Agriculture and Food, the Ministry of the Environment, and the farming community.

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It is anticipated that an educational initiative could be mounted with a single staff resource. As part of the joint MOE/MTRCA Rural Beaches Project, an MTRCA staff member is currently performing this role through funding provided by the MOE. Existing funds, however, will only allow for continuation through mid-1990.

Some of the tasks performed by this person include personal contacts with farm operators, presentations at local Federation of Agriculture meetings, and attendance at agricultural fairs. These education efforts could be extended to establishing displays in suburban shopping centres to improve awareness of the impacts of the non-farming community on local water quality. This person would also respond to requests from local schools to make presentations.

This Rural Clean Water Program could be staffed effectively by one person with knowledge of both rural and urban impacts on water quality. The estimated cost of this program, including salary, benefits, expenses, vehicle would be \$70K annually.

### **C. Develop Legislation**

Ultimately, if increased education and financial subsidies do not achieve the desired effect, some form of legislation may be appropriate. Legislating against agricultural activities which traditionally have been viewed as acceptable would be a significant and controversial step. Stricter legislation under the Environmental Protection Act would be beyond the Metro RAP since this is a Provincial statute. It is likely that local municipal by-laws could be enacted and would be enforced at a municipal level.

Although the concept of introducing legislation to control farming activities may seem drastic or undesirable, the precedent has been set in the United States. In 1985, the U.S. Farm Bill was passed to address severe soil erosion occurring on farms throughout the country. The Bill required that by December 1989, each farm operator submit a detailed farm plan to the Federal Government describing how the farm will be managed to reduce soil erosion. Full implementation of these plans must be achieved by 1994 under the penalty of a reduction or loss of tax benefits.

If is difficult to estimate the cost of this initiative. If indeed, some form of legislation was pursued and passed, funds would be required for proper enforcement. If this legislation was at a municipal level, enforcement would be the responsibility of the municipality's by-law enforcement officer.

In a very real sense, however, enforcement of a by-law such as this one is virtually identical to enforcing current "poop and scoop" by-laws for domestic pets and, at current staffing, would likely be just as ineffective. Adequate staff complements would be essential in those rural municipalities affected by the legislation. Assuming five new staff in rural municipalities across the RAP watershed would be about \$200K annually.

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### **D. Abatement**

As discussed briefly above, abatement or enforcement, is the logical step beyond the enactment of new legislation. Abatement could be achieved through municipal enforcement offices, or it could be pursued as a responsibility of Ministry of Environment Abatement Officers. Currently, neither municipal staff nor MOE Central Region staff (within the RAP area) are oriented toward abatement of agricultural programs. Because of the urban nature of most of the area and the existing legislation which protects "normal farming practice", the greatest emphasis by enforcement and abatement staff is on industrial and municipal problems. In order to actively pursue abatement of agricultural pollution (after a tightening of legislation) additional staff would be required. No costs have been estimated for this option as the staff requirements would be dependent upon the legislative changes adopted. As a guide however the estimate of staff costs provided under option C (\$ 200 K annually) may be used. The responsibility for these costs would rest with MOE.

#### Potential Program Benefits

Implementation of the various program improvements will have quantifiable benefits at the local level in the central and upper portions of the RAP watershed although load reductions to the Lake may be difficult to measure because of other inputs which are significant.

From the perspective of reducing dry weather bacterial loadings, restricting cattle access will result in marked improvements to dry weather water quality in local streams where cattle watering is now presently occurring. Water sampling conducted upstream and downstream of cattle access areas showed increased in fecal coliform bacteria of up to several thousand as livestock watered in the watercourse. In-stream bacterial concentrations as high as 360,000/100ml have been recorded below these sites. Elevated bacterial levels under dry weather conditions are caused by direct fecal inputs into the stream. These inputs eventually contaminate the stream bottom and bacteria is resuspended each time the streambed is disturbed (eg. during runoff).

Implementation of the Rural Clean Water Program would provide an important liaison between government ministries and the rural community. Changing attitudes or management practices is more easily accomplished by establishing personal contact with farm operators and making efforts to understand the issues facing the agricultural community. More importantly however, this Program would go beyond agricultural impacts and deal with the combined impacts of rural development on water quality. This includes impacts from suburban developments, septic inputs, and contributions from wildlife. This broader focus is crucial in attempting to address the variety of problems facing the streams and rivers within the RAP watershed.

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### Dependent Projects

The potential improvements to the existing programs addressing dry weather agricultural impacts are not dependent on any other Component Action except in terms of competition for available resources. It should be emphasized, however, that any success in achieving agricultural control is totally dependent upon the Ministry of Agriculture and Food's new financial assistance program.

### Monitoring Requirements

Intensive in-stream monitoring across the watershed using water samples would probably not be particularly effective in gauging water quality improvement since individual grab samples can be highly variable. A smaller or more targeted sampling program examining selected sites would be valuable in assessing the degree of improvement. At those selected sites, both water and sediment samples should be analyzed for bacteria and nutrients (phosphorus [total and soluble], nitrogen compounds, and suspended solids). These samples would be collected both before and after cattle restrictions were implemented. The degree of water quality improvement could be generalized to other watercourses.

### Reporting Requirements

The degree of success in reducing dry weather impacts may be measured by the level of uptake of subsidy programs. It is anticipated that an annual report would include the following:

- number of meters of fencing installed;
- number of applications received for financial assistance;
- number of farm operators contacted;
- degree of problem within each watershed.

This information could be documented by staff of the Ministry of the Environment, Conservation Authority or the Ministry of Agriculture and Food. Ideally, this function would be best performed through the Rural Clean Water Program which was mentioned previously.

### Implementation

Implementation of these suggested actions will be dependent upon new subsidy programs being available to farm operators in the RAP watershed. At the present time, the Ministry of Agriculture and Food's financial assistance program will expire at the end of March 1990, and no additional programs have been announced. Without such incentives being available, no amount of education efforts will encourage changes to existing farm practices within the RAP watershed. The Rural Clean Water Program could proceed immediately and, indeed, some of these efforts are now being undertaken by a staff member presently working at the

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Conservation Authority on the Rural Beaches Program. These efforts should be implemented on a five-year time frame.

### Potential Delays

As discussed above, the main areas of potential delay involve a lack of response to subsidy and education programs.

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### Summary Information for Implementation

Component Action:	Agricultural Dry Weather Controls
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	None
Implementation Responsibility:	MTRCA/OMAF/MOE
Funding Responsibility:	OMAF/MOE/Municipalities
Additional Costs Range:	Option A : \$ 70 K/yr for 5 years Option B : \$ 635-800 K over 5 years Option C : \$ 70 K annually Option D : \$ 200 K annually Option E : \$ 200 K annually
Monitoring Requirements	Bacteria and nutrients at selected sites
Reporting Requirements:	cattle fencing installed number of applicants farms contacted
Timeframe:	immediate
Potential for Delay	medium
Potential Reasons for Delay	poor response subsidy program

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### REMEDIAL INTENT #4

#### REDUCE THE IMPACTS OF STORMWATER RUNOFF

##### Summary of the Problem

Wet weather discharges, from storm sewers and overland flow contain high levels of contaminants which cause exceedences of the Provincial Water Quality Objectives (PWQO) and contribute significantly to contaminated sediment problems. It is a primary source of the bacteria which are monitored prior to making decisions to post beaches. The impacts on the fishery are less clear. Chronic impacts, such as avoidance behaviour have been observed, but acute effects (fish-kills) have not been observed in the Toronto area as a result of wet-weather discharge, even though concentrations have been recorded in the acute range. This is likely due to the association of the contaminants with particulate matter which reduces the availability, and hence the toxicity of the contaminants. This association of the contaminants with particulate matter contributes significantly to the accumulation of contaminated sediments at the mouths of rivers.

The magnitude of the wet weather discharge problem in the Metro Toronto RAP area is great. There are over 2200 storm sewer outfalls within Metro and many more in the municipalities surrounding Metro. Funding requirements to mitigate stormwater impacts will be large. Aside from funding however, there are problems with the need to establish priorities, and the need to establish that specific remedial measures are effective. It is likely that extensive remedial action will be required before there is any measurable indication of improvement.

In order to reduce the impacts of stormwater runoff, consideration must be given to potential improvements to existing programs, implementation of scheduled initiatives and initiation of new programs. The remedial actions considered in the following sections include:

- Catchbasin Cleaning
- Pet By-Laws
- Sediment Control - Construction
- Erosion Control
- Agricultural Controls
- Pilot Stormwater Ponds
- Federal Leaded Fuel Regulations
- Humber River Water Quality Management Plan
- Don River Watershed Management Strategy
- Basin Management Strategy for the Rouge River
- Provincial Stormwater Program

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### REMEDIAL ACTION #4.1 :

#### Upgrade Municipal and Conservation Authority Best Management Practices

The remedial programs which aim at minimizing the build-up of contaminants on urban lands are termed best management practices or BMP's. The programs include by-law enforcement (dog and litter control), animal control, catchbasin cleaning, street sweeping, and sediment control.

All municipalities enforce "stoop and scoop" by-laws in an effort to control pets. In certain instances wildlife, such as geese, are managed. The success of these efforts is difficult to judge because of the large numbers of birds and animals which are not controlled. This presents a difficulty in determining the resources to be allocated beyond those necessary to minimize aesthetic impacts.

Catchbasin cleaning is carried out by all municipalities. The frequency of cleaning varies between twice per year and once every two years, depending on the municipality and the type of road. Street sweeping is also conducted by all municipalities. The benefits of street sweeping are primarily aesthetic, as studies conducted under TAWMS have shown that the practice is ineffective in removing contaminants. No increase in the frequency of street sweeping was recommended under TAWMS.

Sediment control, especially during construction, is an important BMP. Sediment and erosion control guidelines are available, and the Metropolitan Toronto and Region Conservation Authority (MTRCA) requires that provisions be made for sediment and erosion control during construction (as part of their comment and approval process). The Conservation Authority also operates programs designed to reduce the impacts of agricultural sources of pollution.

The municipalities and the Conservation Authority conduct these programs for a variety of reasons. In many cases the programs were designed and initiated for reasons other than water quality improvement. The programs have been adapted and revised to provide water quality benefits, but in some cases there is a lack of consistency from one jurisdiction to another. One of the keys to an "operational" ecosystem management is agreement to conduct BMPs in a similar fashion on all watersheds.

### COMPONENT ACTION #4.1.1 :

#### Improved Catchbasin Cleaning

Surface (road) dirt and dust accumulation is washed to catchbasins and storm sewers during rainfall and snowmelt. The ability of catchbasins to retain solids and removal of solids thereafter is linked to water quality in rivers and lakes. The total solids removal efficiency appears to be related to the percent of catchbasin sump being utilized. When the sump is more than 60% full, the removal efficiency is less than 6.5% (Pitt, 1985). A study of the Humber River Watershed (MOE, 1986) estimated a solids reduction of about 15% due to

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street sweeping and cleaning of catchbasins twice annually. Most of the benefit comes from catchbasin cleaning since the effect of street sweeping is negligible.

A review of the TAWMS Humber River Report and other literature sources on catchbasin cleaning (Pitt, 1985) supports a catchbasin cleaning frequency of twice yearly, on average, for improved water quality. This is based on maintaining the catchbasin below the 60% full. The necessary cleaning frequency in specific catchments will vary according to the rate of dust and dirt accumulation.

The estimated solids removal based on the survey data is nearly 200 kg/catchbasin. Catchbasins in the Metro Toronto area on average yield 150 kg of solids for catchbasins 50 - 60% full (MOE, 1988). The average sump volume was 300 litres and typically ranged between 100 to 400 Litres. The liquid associated with catchbasin cleaning is discharged to sanitary sewers where it can be treated by the sewage treatment plant.

The removal efficiency for specific water quality parameters would depend on whether that parameter is strongly associated with total solids removal. For example heavy metals, which are strongly related to sediments, would have the highest removal efficiency. By way of illustration, the average removal efficiency associated with the sediments removed is as follows:

<u>Parameters</u>	<u>Removal Efficiency</u>
Metals	40 - 80%
BOD	35%
Phosphates	10%

It should be recognized that catchbasin cleaning has virtually no effect on bacteria loadings from urban areas.

### Existing Programs

Options for program improvement range from ensuring that the existing programs are maintained into the future to increasing the frequency of cleaning. It should be recognized that cb cleaning costs are increasing because of increased disposal costs. Expenditures by municipality in 1988 and budgets for 1989 are shown below. All costs are borne completely by the municipality.

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### Existing Municipal Practice - Catchbasin Cleaning

REGION	MUNICIPALITY	No. OF CATCHBASINS	CLEANING FREQUENCY		BUDGETS		CB TO BE CLEANED	
			NORMAL	CRITICAL	1988	1989	1988	1989
Durham	Durham	NA	Bi-Annual	As Req.	23	31	2489	3000
	Pickering	2600	Bi-Annual		15	15	1200	1400
	<b>SUBTOTAL</b>	<b>2600</b>			<b>38</b>	<b>46</b>	<b>3689</b>	<b>4400</b>
Metro	City of York	5200	Bi-Annual	Semi-Ann.	52	52	3371	3500
	East York	4500	Annual		59	59	3800	3500
	Etobicoke	22000	Annual	Annual	75	225	22000	44000
	Metro	NA			NA	NA	NA	NA
	North York	29500	Annual	Semi-Ann.	260	280	29500	29500
	Scarborough	26000	Bi-Annual	Annual	87	100	13300	13500
	Toronto	32240	Annual	As Req.	398	409	31493	32240
	<b>SUBTOTAL</b>	<b>119440</b>			<b>931</b>	<b>1125</b>	<b>103464</b>	<b>126240</b>
Peel	Brampton	11000	Annual	Annual	NA	NA	11000	8000
	Caledon	900			11	13	500	900
	Mississauga	26000	Bi-Annual	Annual	60	65	11000	13000
	Peel	2475	Annual	Annual	30	69	2475	2550
	<b>SUBTOTAL</b>	<b>40375</b>			<b>102</b>	<b>147</b>	<b>24975</b>	<b>24450</b>
York	King	NA			NA	NA	NA	NA
	Markham	6500	Bi-annual	Annual	27	40	3292	4500
	Richmond Hill	2200	Annual	Annual	11	13	2200	2500
	Vaughan	NA	Annual	Annual	NA	NA	NA	NA
	Whitchurch	350	Bi-Annual	Annual	NA	NA	88	188
	York	3400	Annual	Annual	59	70	3200	3500
	<b>SUBTOTAL</b>	<b>12450</b>			<b>97</b>	<b>123</b>	<b>8780</b>	<b>10688</b>
	<b>TOTAL</b>	<b>174865</b>			<b>1168</b>	<b>1440</b>	<b>140708</b>	<b>165778</b>

The costs provided represent budgets as provided by the specific municipalities for the operation of current programs. There is considerable variation in the unit costs provided by municipalities, ranging from \$5 to \$22 per CB cleaned. In some cases the costs do not appear to include costs of disposal. Based on the information provided however, the current level of spending is about \$1.4 M in the municipalities reporting.

Many municipalities consider the current programs to be adequate. It is likely that the current programs are relatively effective, but no information is available to indicate how effective. Catchbasin cleaning is carried out by works staff or under contract and no records are kept as to how full the catchbasins were at the time of cleaning. The large number of catchbasins would make any such accounting any onerous task and is not considered a practical use of municipal staff time. If potential improvements in the frequency of cleaning are to be advocated it will have to be based on pilot study results and professional judgement.

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### Potential Program Improvements

Three potential levels of enhancement are presented below:

- a) annual cleaning in all municipalities
- b) annual cleaning, plus semi-annual cleaning in high-use areas, including major arterial streets, industrial areas and commercial districts
- c) semi-annual cleaning in all municipalities

#### **A. Annual Cleaning**

Many municipalities conduct cb cleaning on an annual basis on average. In order to move all municipalities to this level it is estimated that about \$ 240 K would have to be committed on an annual basis by those municipalities currently cleaning on a bi-annual basis. The specific commitments for these municipalities are estimated below.

ADDITIONAL CATCHBASIN CLEANING COSTS FOR CLEANING ONCE YEARLY			
MUNICIPALITY	NO. OF CATCHBASINS NOT CLEANED IN 1988	UNIT COST	COST
Pickering	1,400	12.50	17,500
East York	700	15.40	10,780
York	1,829	6.30	11,520
Scarborough	12,700	6.50	82,550
Markham	3,208	7.80	25,000
Caledon	400	22.60	9,040
Mississauga	15,000	5.50	82,500
Whitchurch-Stouffville	262	10.00	2,620
TOTAL COST			241,510

**Notes:**

O & M unit cost obtained from survey data, except for Whitchurch-Stouffville which did not have costs data. An average unit cost of \$10.00 per catchbasin is used for Whitchurch-Stouffville.

#### **B. Annual Cleaning Plus Semi-Annual Cleaning in Selected Areas**

A second level of enhancement for this remedial measure would involve annual cleaning of catchbasins in all municipalities, supplemented by semi-annual cleaning in areas where solids build-up rates are high or typical sump volumes are low. Typically semi-annual cleaning would occur in industrial and commercial areas and on major arterial roadways. In addition, frequent cleaning of CBs in areas undergoing heavy construction activity would be warranted. The intent would be to ensure that the sumps of all catchbasins would remain less than 60 % full at all times.

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Some municipalities currently clean CBs in critical areas semi-annually. Others list cleaning frequency in these areas as "as required". Etobicoke, which typically uses CBs with a small sump volume, has been upgrading its cleaning frequency in recent years. Actual costs associated with this level of enhancement would depend upon the number of catchbasins designated for semi-annual cleaning. Estimates of potential costs to municipalities are provided below based on the assumption that 25% of the catchbasins would receive semi-annual cleaning. Implementation of this enhancement would require that municipalities provide a schedule of catchbasins designated for semi-annual cleaning.

ESTIMATED ANNUAL COSTS ANNUAL CLEANING PLUS SEMI-ANNUAL CLEANING IN HIGH USE AREAS				
REGION	MUNICIPALITY	CATCHBASINS ANNUAL	CLEANED SEMI-ANN.	ESTIMATED COSTS (\$ 1000s)
Durham	Durham	NA	NA	NA
	Pickering	2600	650	33
	SUBTOTAL	2600	650	33
Metro	City of York	5200	1300	65
	East York	4500	1125	56
	Etobicoke	22000	5500	275
	Metro	NA	NA	NA
	North York	29500	7375	369
	Scarborough	26000	6500	325
	Toronto	32240	8060	403
	SUBTOTAL	119440	29860	1493
Peel	Brampton	11000	2750	138
	Caledon	900	225	11
	Mississauga	26000	6500	325
	Peel	2475	619	31
	SUBTOTAL	40375	10094	505
York	King	NA	NA	NA
	Markham	6500	1625	81
	Richmond Hill	2200	550	28
	Vaughan	NA	NA	NA
	Whitchurch	350	88	4
	York	3400	850	43
	SUBTOTAL	5950	1488	155
TOTAL		168365	42091	2186

Notes: All costs assume a unit cost of \$10/CB cleaned

The total cost of this option is estimated to be approximately \$ 750 K above the budgets reported for 1989. Additional costs are expected to be somewhat higher because a number of municipalities have not reported and have therefore been omitted from these estimates.

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**C. Semi-annual Cleaning in All Municipalities**

This level of enhancement corresponds to the recommendations made in the Humber River Water Quality Management Plan. Its effectiveness in terms of water quality improvement is has not been proven, especially in relation to the enhanced levels of cleaning. The aim of all of the CB cleaning enhancements is to ensure sufficient sump volume to allow the CB to operate effectively. Semi-annual cleaning is undoubtedly unnecessary in many instances where build-up and wash-off are slow. Semi-annual cleaning does however provide a relatively easy program to implement, not requiring the identification and designation of high use areas as in option B. The costs of providing semi-annual cleaning are shown below.

ESTIMATED ANNUAL COSTS SEMI-ANNUAL CLEANING IN ALL MUNICIPALITIES			
REGION	MUNICIPALITY	CATCHBASINS	ESTIMATED ANNUAL COSTS
Durham	Durham	NA	NA
	Pickering	2600	52
	SUBTOTAL	2600	52
Metro	City of York	5200	104
	East York	4500	90
	Etobicoke	22000	440
	Metro	NA	NA
	North York	29500	590
	Scarborough	26000	520
	Toronto	32240	645
	SUBTOTAL	119440	2389
Peel	Brampton	11000	220
	Caledon	900	18
	Mississauga	26000	520
	Peel	2475	50
	SUBTOTAL	40375	808
York	King	NA	NA
	Markham	6500	130
	Richmond Hill	2200	44
	Vaughan	NA	NA
	Whitchurch	350	7
	York	3400	68
	SUBTOTAL	5950	249
TOTAL		168365	3497

Notes: All costs assume a unit cost of \$10/CB cleaned are shown in thousands

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The total cost of this option is estimated to be approximately \$ 2.1 M above the budgets reported for 1989. Additional costs are expected to be somewhat higher because a number of municipalities have not reported and have therefore been omitted from these estimates.

### Potential Program Benefits

Enhanced cleaning of catchbasins can reduce the loads of heavy metals generated in urban areas. The Humber River Water Quality Management Plan estimated reductions of 12, 7, and 10% for lead, zinc, and copper loads from urban areas by moving to semi-annual cleaning. These reductions were based on the strategy of keeping the CB sump volumes below the 60% level and it was assumed that semi-annual cleaning would be required to achieve this. Catchbasin cleaning has relatively little effect on nutrients and virtually no effect on bacteria.

Catchbasins are not sophisticated sediment trapping devices and there are limits to the water quality benefits that can be achieved through enhancements to existing programs. Studies conducted in the U.S. however have indicated the potential for reduction in the overall cost of catchbasin cleaning with increasing cleaning frequency.

### Dependent Projects

Enhanced catchbasin cleaning is not dependent upon any other projects considered in the RAP, except in terms of the resources available to the implementing agencies. Availability of disposal sites for catchbasin spoils must be considered.

### Monitoring Requirements

Water quality monitoring to gauge the effect of catchbasin cleaning is not warranted because of the distributed nature of the effect. Periodic sampling of catchbasin spoils should be undertaken in order to quantify the contaminants load reduction and to establish trends resulting from other programs such as the Federal leaded fuel regulations.

### Reporting

Regardless of the level of enhancement selected (if any) municipalities or their contractors should keep records and report the following on an annual basis.

- number of catchbasins cleaned
- weight or volume of solids collected
- annual O&M costs
- annual disposal costs

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### Implementation

Since the proposed enhancements involve extensions to existing programs implementation will require only funding approval by the responsible agency.

### Potential Delays

No delays are anticipated once municipal approval is received.

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### Summary Information for Implementation

Component Action:	Improved Catchbasin Cleaning
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Federal leaded fuel regs Humber River Plan Don River Plan
Implementation Responsibility:	municipalities
Funding Responsibility:	municipalities
Additional Costs Range:	\$0.24 M - \$2.1 M (annually)
Monitoring Requirements	minor
Reporting Requirements:	number of CBs cleaned wt/vol of solids collected annual O&M costs annual disposal costs
Timeframe:	next fiscal year
Potential for Delay	low
Potential Reasons for Delay	none

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### Reference Documents

Metro Toronto Remedial Action Plan : Documentation of Current Remedial Programs  
R.V. Anderson Ltd., 1989.

Humber River Water Quality Management Plan, TAWMS, 1986.

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### COMPONENT ACTION #4.1.2 :

### Pet Control By-Law Enforcement

Animals present within the urban watersheds, both domestic and wild, contribute faecal matter to stormwater runoff. This contributes to the Faecal Coliform loading during and after storms which in turn leads to the posting of beach areas. The problem has been widely recognized and most municipalities have responded by passing "Stoop and Scoop" by-laws.

#### Existing Programs

The programs currently in existence do not generally depend on routine patrolling. Great reliance is placed on members of the public to report incidents and be willing to appear in court to assist in prosecution. Occasional patrolling is carried out but is restricted to normal business hours. It is probable that most offenses are committed outside the hours of patrol.

There is no definitive information relating directly to water quality with which to gauge the effectiveness of the programs. The programs are difficult to enforce and prosecutions are few.

Since pet control in all municipalities is usually part of the Animal Control Act, it has not been possible to gather funding information directly related to "stoop and scoop" program in most cases. During interviews with staff it became apparent that efforts to control dog litter is being frustrated by a number of problems, in particular, existing legislation.

Several impediments were recorded and these are summarized below:

- (i) Most by-laws limit the maximum fines to \$2,000, although fines levied in the courts are substantially lower (usually less than \$100).
- (ii) To achieve a successful conviction the prosecution would need a witness. In this respect members of the public are extremely reluctant to appear in court.
- (iii) By-law enforcement officers have limited powers to identify offending dog owners and there are difficulties linking the dog to the owner. Uncooperative dog owners can, lawfully, refuse to identify themselves.
- (iv) Most violations take place outside normal office hours (i.e. early morning hours or in the evening).
- (v) The Provincial Offences Act requires the summons to be delivered in person to the alleged violator.

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Finally, while a lack of resources and staff are seen as major impediments, it is clear that merely increasing the level of allocated resources will not have a dramatic effect on the number of convictions. In addition to increasing resources, the by-law enforcement officers will need to be given additional powers under revised legislation. Assuming that this is possible and that the by-law enforcement department is able to function over longer hours, the number of convictions will increase. It is not known what level of resources is required, nor to what degree legislation must be changed in order to provide a measurable effect on water quality.

In addition to enforcement concerns, most municipalities indicated that public awareness is an important part of this program. For it to be complete, public awareness should be seen to include:

- (a) Awareness of the existence of legislation.
- (b) Awareness of the environmental impact of disregarding the requirements of the by-law.
- (c) Awareness of the consequences of being caught.

Points (a) and (b) can be achieved by educating the public through advertising and distribution of literature. For point (c) to be effective, the awareness of the consequences must be accompanied by a dissuasion to commit an offense (i.e. the fines associated with this type of violation must be seen to constitute an adequate deterrent).

### Potential Program Improvements

The primary objective of the programs should be to increase public awareness and environmental responsibility. It would be desirable to reduce the entry of faecal coliform from dog faeces into the storm sewer system. The enforcement of the by-law in this respect is seen as a source control measure by TAWMS. It is doubtful however that an improved enforcement program will bring about significant reduction in animal wastes without much more stringent legislation.

Two potential levels of improvement are presented below:

- a) Increase public awareness of the need for pet control
- b) Adopt more stringent legislation

#### **A. Increase Public Awareness**

Most municipalities currently enforce "stoop and Scoop" by-laws. The enforcement is operated at a level which aims primarily at educating the public. It is questionable whether

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the programs are effective in this regard however because of the hours of operation and the "confrontational" situation that often occurs.

A potential enhancement to the educational aspect of the program would be to prepare a brochure describing the environmental impacts of animal faeces, especially in relation to beach closures. Owner responsibilities under existing by-laws could be highlighted. The brochure could be distributed through veterinary offices, at rabies clinics and during license distribution.

The costs of design and production of such a brochure have not been determined. Responsibility for the costs and implementation would belong to the local municipalities.

### **B. Adopt More Stringent Legislation**

A second level of enhancement to existing programs could involve more stringent legislation, greater powers of enforcement, and much heavier fines. If such a measure was adopted then an increase in staff for enforcement might be considered.

The feasibility of this option is questionable at the present time. It is proposed that the option, if considered desirable, be turned over to the Health members of the Technical Advisory Committee for a report to be incorporated into the RAP at a future time.

### Potential Program Benefits

The TAWMS Steering Committee recommended increased enforcement of pet by-laws as part of the Humber River Water Quality Management Plan. This was based upon a potential reduction of faecal coliform loads from urban areas of up to 20%. Based on experience to date however, it is likely that this will remain a potential in terms of water quality improvements. It is unlikely that any significant reduction in faecal coliform levels following rainfalls will be manifest as a result of the options considered.

The options may be justifiable from a "public attitude improvement" perspective.

### Dependent Projects

Enhancements to pet by-law programs are not dependent upon any other projects considered in the RAP, except in terms of the resources available to the implementing agencies. The Humber and the Don River water quality management plans made recommendations for increased enforcement of pet control by-laws.

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### Monitoring Requirements

Water quality monitoring to gauge the effect of pet by-laws is not warranted because of the large number of uncontrolled animals on the urban watersheds.

### Reporting

Reporting requirements will depend on the option (if any) selected.

### Implementation

The steps required in implementing enhancements to pet by-law control programs are dependent on the options. Discussion of implementation steps and target dates is therefore deferred until after option selection is completed.

### Potential Delays

No delays are anticipated once options are selected and municipal approval is received.

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### Summary Information for Implementation

Component Action:	Pet Control By-law Enforcement
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Humber River Plan Don River Plan
Implementation Responsibility:	municipalities
Funding Responsibility:	municipalities
Additional Costs Range:	not costed
Monitoring Requirements	none
Reporting Requirements:	option dependent
Timeframe:	option dependent
Potential for Delay	low
Potential Reasons for Delay	none

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### Reference Documents

Metro Toronto Remedial Action Plan : Documentation of Current Remedial Programs  
R.V. Anderson Ltd., 1989.

Humber River Water Quality Management Plan  
TAWMS, 1986.

### COMPONENT ACTION #4.1.3:

### Improve Control of Sediment From Construction Activities

During the construction phase of any urban development, eroded sediment during runoff events may increase by one thousand times or more compared to predevelopment conditions (UDI 1987). Uncontrolled erosion from construction activities and sediment transport into watercourses results in serious environmental damage. High erosion rates can result in loss of valuable topsoil, and the subsequent sedimentation of rivers and lakes can affect water supplies, flood control, fishing, navigation, recreational activities, and the general health of the aquatic environment. In addition, the fine grained silts often associated with the surficial layers act as the vehicle by which trace metals and other toxic compounds enter the aquatic system.

Measurements of erosion rates, taken from various land uses, show a wide range of values depending on construction techniques, soil conditions, vegetation, and climate. However, representative erosion rates for construction sites with no erosion control measures are, on average, 200-400 times higher than the natural erosion rate for rural land use.

### Existing Programs

For the purposes of this assessment, erosion and sediment transport are assumed to occur from two primary sources:

- a) erosion from highway construction;
- b) erosion from industrial, commercial or residential development.

### **Highway Construction**

The environmental aspects of sediment control as it relates to highway construction, is largely governed by requirements of the Environmental Assessment Act. Under this Act the Ministry of Transportation is obliged to assess the potential environmental impacts of alternative approaches to carrying out a project. This assessment is prepared by the Ministry of Transportation Planning and Design Section with input from the Environmental Units and submitted to MOE, and until it has been accepted and the project approved, MOT cannot proceed with construction.

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All projects in the Provincial Highways Program are screened for environmental assessment purposes. Based on this screening, they are separated into three groups, each having distinct environmental assessment requirements.

**Group A Projects** involve the construction of new highways or major realignments of existing highways. They are subject to individual assessment.

**Group B Projects** include improvements to existing highways on a smaller scale than for those in Group A. They are subject to a Class Environmental Assessment, which reduces the full requirements of the Act while still ensuring its intent is fulfilled.

**Group C Projects** involve minor reconstruction or maintenance, and are exempt from the full requirements of the Act.

For each of these situations, comprehensive erosion control guidelines are well documented and their use is required. The enforcement of the guidelines and routine monitoring of the site is the responsibility of the MOT or their agent.

### **Industrial, Commercial or Residential Construction**

Virtually all construction activities require some form of erosion and sediment control measures. These are normally incorporated into the stormwater management plans for each development proposal. All developers applying for draft plan approval must provide a brief outline of the general strategy proposed for implementing the required erosion and sediment controls. The last step in the development process requires the preparation of a stormwater management plan. In this document, an erosion and sediment control summary is prepared which outlines in detail the specific control measures required to satisfy environmental concerns.

Although all commenting agencies (MOE, MNR, MTRCA) comment on the need for proper erosion and sediment control it is the municipality or their agents which are responsible for inspecting and reviewing the erosion and sediment control programs. The current erosion and sedimentation problems existing within the RAP watershed are generally not the result of poor techniques, but rather of poor or inadequate enforcement of control measures and inadequate legislation.

The legislative tool of the Conservation Authority, in relation to construction activities, is Ontario Regulation 293/86. This Regulation is designed to restrict, and possibly prohibit the placement of fill within a regulated area, the construction of structures within a floodplain (an area vulnerable to flooding), and the alteration of a watercourse. The Conservation Authority employs three Enforcement Officers to administer this regulation and issue violations or stop work orders if warranted. The Authority's enforcement officers are not empowered to charge

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a contractor who refuses to comply with erosion and sediment control requirements; their primary function is the enforcement of the aforementioned Regulation 293/86.

When problems arise, the Enforcement Officers notify the contractor and the municipality of the situation. Enforcement of erosion and sediment control measures is the responsibility of the municipality or its agents. With over 600 permit applications currently on file at the Authority, it is impossible to adequately enforce all job sites. In addition, the maximum fine of \$1,000 is little deterrent to a developer.

### Potential Program Improvements

The following program improvements would benefit the current program.

#### **A. Improve Enforcement of Existing Guidelines**

The guidelines, as they currently exist, are considered adequate to resolve many of the concerns regarding construction impacts. The main problem results from an inability to properly enforce the existing legislation. To improve the situation, additional staff resources are required. This staff could be employed either by the municipality or by the Ministry of the Environment. Since the main authority for enforcement would be through agreements between the municipality and the proponent, municipal responsibility for enforcement is favoured. At a minimum, there should be four people hired whose sole responsibility is to check construction sites. The cost for this staff would probably be in the range of \$ 200K/year.

#### **B. Introduce New Legislation**

New legislation could be enacted to reflect the seriousness of the situation. The present system of fines and a general reluctance to pursue violations in the courts limit efforts to enforce compliance.

Fines could be raised from \$1,000 to \$25,000 for a successful conviction. This would improve the willingness to rectify outstanding problems, and could also make it worthwhile to pursue matters in the courts. It is difficult to estimate costs for the legal process involved in altering this legislation. It is imperative, however, that any new legislation be accompanied by the additional enforcement mentioned previously.

#### **C. Improved Education of the Development Industry**

Many of the problems currently being experienced in controlling sediment inputs are not necessarily the result of intended negligence, but of ignorance. The view of sediment as a pollutant is not always apparent to job site employees who may not grasp the downstream impacts caused by "a little dirt" entering a stream. Although it is not a current job

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responsibility, Conservation Authority enforcement officers have undertaken to conduct informal slide presentations to various segments of the development industry. This level of education effort, however, is not adequate to properly address the problem.

Education should be a major responsibility of whatever staff are charged with enforcing the existing guidelines. This would be part of the job function under option A and so no further costs are foreseen.

### **D. Institute Better Methods of Erosion and Sediment Control**

During construction, erosion and sediment control techniques typically involve use of straw bales staked around the perimeter of the construction site. Filter fences may also be used singly, or in combination with the straw bales. Straw bales are, at best, a minimum requirement, and in many situations, are simply ineffective in controlling large volumes of sediment. It is incumbent upon the responsible agencies to ensure that the application of erosion and sediment control measures are adequate for each situation. Technical workshops on this topic would be valuable in this regard and would include representatives of the Ministries of the Environment and Natural Resources, the Conservation Authority, municipalities and consultants.

#### Potential Program Benefits

Each of the previous program improvements have the potential to create significant benefits in controlling impacts from construction activity. Although the addition of staff to enforce guidelines is vital to improving the current situation, the introduction of harsher penalties would aid in fostering compliance with the guidelines.

Any reduction in sediment impacts will have major dividends in terms of stream health and would reduce the export of sediment from the watersheds to the lake.

#### Dependant Projects

No other projects or programs would impact the implementation of these program improvements.

Other related projects include:

<u>Component Action</u>	<u>Description</u>
3.3.1	Agricultural Dry Weather Sources
4.1.4	Erosion Control
4.1.5	Agricultural Wet Weather Sources
5.4.1	Stream Rehabilitation and Improvement

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### Monitoring Requirements

No ambient monitoring is required as part of the RAP. Inclusion of monitoring requirements as part of the development agreement should be required. Municipal monitoring would be in the form of site inspections. Depending on the size of the job and the degree of problem, some sites would be inspected more frequently and without warning.

### Reporting

Enforcement staff should maintain records which include, but are not limited to the following:

- no. of sites inspected
- no. of warnings issued
- no. of violations issued
- no. of successful convictions.

This information should be recorded annually in the RAP report.

### Implementation

Currently the responsibility for enforcement is not clearly defined. Specific monitoring responsibilities need to be established if sediment from construction activities is to be controlled.

### Potential Delays

Negotiations are expected to be necessary to determine which agency would be responsible for enforcement.

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### Summary Information for Implementation

Component Action:	Sediment Control : Construction
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Agricultural Sources Erosion Control Stream Rehabilitation
Implementation Responsibility:	Municipality/province/MTRCA
Funding Responsibility:	Municipalities
Additional Costs Range:	Option A : \$ 200 K/yr Option B-C : not costed
Monitoring Requirements	site inspections
Reporting Requirements:	sites inspected; warnings issued; violations issued; convictions
Timeframe:	Immediate
Potential for Delay	medium
Potential Reasons for Delay	Negotiation of enforcement responsibility

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### COMPONENT ACTION #4.1.4:

### Improve Erosion Control to Reduce Sediment Production

Erosion Control Programs, for the purposes of this report, refer to those initiatives which seek to minimize the aggravation or creation of erosion as a result of new development and to rectify existing problems through protective works. Erosion is a natural process.

Erosion is often accelerated through human activities which are essentially subject to man's control. With further urbanization within the RAP area, river erosion will continue to be influenced by the ever changing hydrologic and hydraulic characteristics of the river system. The significance of this general process is magnified by the increasing pressures for use of land within erosion susceptible areas abutting the watercourses. Efforts to minimize increases in the rate and volume of runoff as a result of a land use change are the most important preventive measure which can be undertaken. There will continue to be a need however, for a program to remedy existing sites which are susceptible to erosion.

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### Existing Programs

The MTRCA is the only agency mandated to address erosion control within the RAP watershed. Under the Authority's "Erosion Control Program", two key components are emphasized; prevention and protection.

The prevention component, as the name implies, is directed at preventing future erosion problems as well as rectifying existing ones. The main thrust of this component is directed at enforcement of a number of criteria such as: "set backs" for development; surface drainage plans; and preparation of stormwater management plans. The criteria are used to reduce the potential for erosion, both locally and downstream.

The protection component of the Erosion Control Program, addresses itself to the protection of life and property. Erosion projects are separated into major and minor remedial work sites. Major work sites are those where a structure or a sizeable land area will be threatened in the near future and significant engineering works are required for its protection. Minor work sites are those where a small amount of protective work, whether it be rip-rap or vegetation, carried out now, will prevent a serious problem from developing later.

The most severe consequence of erosion, from a RAP perspective is the production of sediment. It should be emphasized that the remedial works carried out under the Authority's Erosion Control Program are not prioritized based upon sediment generation and water quality improvement. Protection of life and property, either in the valley systems of the RAP watershed or along the waterfront, is the overriding factor. Clearly, however, all erosion control works do result in a reduction in sediment loadings.

The following table provides a summary of major and minor remedial erosion control projects from 1979-1989. This summary illustrates the major emphasis placed upon erosion control within the most urbanized portions of the RAP watershed. Approximately 66% of the major works completed since 1979, have been within Metropolitan Toronto, and 100% of the minor projects have also occurred within these boundaries.

#### **SUMMARY OF MAJOR AND MINOR REMEDIAL WORKS 1979 - 1989**

<u>Location</u>	<u>Major Works</u>	<u>Minor Works</u>	<u>Total Expenditure</u>
Metro Toronto	59	53	\$6,910,000
Peel	12	0	\$ 363,500
York	19	0	\$ 240,500

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Significant erosion sites exist along the most urbanized portions of the Mimico Creek, Humber River, Don River, and Highland Creek. It should be re-emphasized that a current erosion site inventory would only list those locations having a life or property hazard associated with them. It would not indicate areas of significant sediment production, where no hazard exists.

Since erosion is a dynamic process, physical conditions of a site are subject to continual changes. Based on year-round monitoring, the severity of the problem at a given time and its relative potentials to deteriorate, the Authority continues to update the priorities on an annual basis.

The funds for the capital works under the Erosion Control Program are obtained via a 55% Provincial grant and a 45% municipal levy. In 1988, the budget for this program was \$1.8 million. In 1989, the allocation is estimated at \$2.3 million. Typically, the greatest portion of the annual budget is directed to lakefront erosion control works. Approximately eight staff devote all or a portion of their time toward the implementation of the Erosion Control Program. A core group of five field staff is responsible for the erosion works. This staff works out of a Conservation Authority workshop in Markham. Seasonal staff are hired for about 10 months of the year. The MTRCA rents the heavy equipment required, on an annual basis. Three staff members work within the Conservation Authority head office, responsible for designing capital works projects, ranking of remedial sites, and the regular inspection of erosion sites.

Erosion control works are completed to protect both public and private property. The protection of private structures must involve owner participation in land and/or money to a level determined by the Authority. Any land on which remedial works are implemented must be in Authority control whether it be by title or easement. In 1988, individual landowners contributed \$30,000 toward remedial works within the RAP watershed.

In terms of program effectiveness, Conservation Authority staff feel that the current level of funding is adequate to ensure that all major erosion sites are dealt with on an "as needed" basis. During the last three years (1987-89), work on major erosion sites averaged about 2 to 3/year. About 4 or 5 minor sites were also completed each year. Major erosion sites are ideally scheduled for completion within a year. When erosion sites arise unexpectedly, staff reallocate resources to address the most serious problem. This means that some minor erosion sites are often deferred.

This program is implemented on a common basis across the RAP watersheds, based on damage potential. The most significant erosion occurs on the lower portions of the major watercourses within Metropolitan Toronto. As one moves northward into the central and headwater portions of the RAP watershed, erosion concerns from a fisheries or sediment perspective are addressed through Stream Improvement Programs of the Conservation

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Authority and the Ministry of Natural Resources. These initiatives are described further in Component Action #5.4.1.

As mentioned previously, the most intensive efforts are directed at completing works for new erosion sites; maintenance of older sites or preventative measures are of lesser priority. Maintenance funding is generally inadequate to ensure that repairs can be made as they are needed. The provincial funding mechanism does not allow for older erosion sites to be placed on the priority list; the required funds must come from a specified maintenance budget.

The prevention component to the Authority's Erosion Control Program is generally addressed through enforcement of policies or regulations relating to development in floodplain or flood risk areas, and through control of storm flows from developed areas. As such, it is difficult to apportion specific costs to these efforts.

### Potential Program Improvements

The Conservation Authority's Erosion Control Program is the only avenue by which remedial measures are undertaken to protect hazard erosion sites. Any costs associated with improvements to the existing program would be in the form of increased provincial input via the Ministry of Natural Resources, and the Authority's member municipalities through levy. Below are a number of potential enhancements:

#### **A. Increased annual funding to ensure that all priority sites receive attention.**

There are currently (in 1989) 7 outstanding priority sites. On average, there are about 5 to 10 priority sites in any year which cannot be undertaken due to funding constraints. Based upon average project costs, the annual increases necessary would be \$500,000 - \$700,000. These funds would be primarily for capital costs although about 10 - 15% would be required for additional seasonal staff. Assuming the continuation of current funding formulas, implementation of this option would require an increase in provincial grants of about \$350 K annually and an increase in municipal funding of about \$275 K.

#### **B. Increased funding to survey, prioritize, and conduct remedial works on sediment generating sites.**

Significant funding would be required to undertake an effort of this magnitude. There are no current estimates of sediment generating sites within the central and lower reaches of RAP watersheds, but if 10 sites were targeted each year the additional costs would be \$700,000 to \$1,000,000/annum. For the purposes of this discussion, it is assumed that funding would be provided on a basis similar to the existing programs, resulting in a \$550 K/yr provincial cost and a \$450 K/yr municipal cost.

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### **C. Elimination of private landowner contributions.**

As previously stated, when projects are undertaken for protection of private property, some amount of landowner contributions are required. Eliminating this policy would reduce landowner reluctance to participate and reduce staff time spent in negotiations. Based on average landowner contributions from 1987 - 1989, this cost would amount to \$25,000 - \$35,000/year, or about \$20 K for the Province and \$15 K for municipalities annually.

### **D. Utilize more environmentally sensitive erosion control techniques**

The historical approaches used to achieve erosion control in urbanized watercourses have been detrimental to aquatic health of streams. The use of cement channels was promoted as a single-purpose solution to the problems of flood control in the 1960's and 70's and although major efforts have been spent in alternative approaches to concrete-lined channels, greater emphasis could be placed on addressing multi-purpose uses. The options available, however, are limited in the lower stretches of urbanized streams where storm flows are excessive. Of the three major approaches; grade and rip rap, gabion baskets, or armour stone, the use of grade and rip rap offers the best opportunity to improve in-stream habitat by providing refugia for fish and benthic organisms. In addition, the judicious placement of rocks in the stream channel can also provide valuable improvements to stream habitat. The main flaw in using armour stone is the "sheer wall" appearance, affording little opportunity for vegetation to become established or for fisheries habitat to be created. These disadvantages can be overcome somewhat by placing rip rap rocks at the base of the armour stone face and by establishing significant plantings at the top of the bank.

In terms of expense, both armour stone and rip rap are similar, costing about \$7,000/10 meters. Current Authority practice is to use alternatives to concrete channels. Although additional cost may be expected when addressing multi-purpose use, these costs are not quantifiable except on a project by project basis.

### **Potential Program Benefits**

Substantial increases in capital funding would ensure that all priority erosion sites are addressed as they occur. As mentioned earlier, priority erosion sites are not ranked based upon sediment generation, but are judged by hazard to life or property. From the perspective of stream and lake health, a change in the current ranking system may be warranted.

Altering the program to also include capital works on sediment generating sites not associated with loss of property or hazard to life, would be a major undertaking. In terms of reducing sediment loads from streambank and shoreline sites, this would be the most effective option. Streambank sources are typically responsible for up to 30% of the total sediment load delivered from a watershed.

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### Dependent Projects

Changes to the Authority's Erosion Control Program are not dependant upon any other projects considered in the RAP except in terms of available funding. Related prgrams include:

<u>Component Action</u>	<u>Description</u>
3.3.1	Agricultural Dry Weather Sources
4.1.3	Sediment Control During Construction
4.1.5	Agricultural Wet Weather Sources
5.4.1	Stream Rehabilitation and Improvement

### Monitoring

Site specific water quality monitoring to gauge the effect of erosion control works is not suggested because of the distributed nature of the benefits. Routine water sampling should continue, however, to gauge long-term trends in sediment loadings.

### Reporting

Regardless of the level of enhancement selected (if any), Authority staff should continue to keep records of:

- # of sites completed
- area of eroding bank
- estimate of annual sediment generation
- annual costs

The results of erosion control work should be included in the annual RAP report.

### Implementation

Implementation of program improvements could begin immediately if funds become available. A revised prioritization for sediment-generating sites would require approximately one year.

### Potential Delays

None anticipated other than those caused by funding constraints.

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### Summary Information for Implementation

Component Action:	Erosion Control
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Agricultural Sources Sediment Control: Construction Stream Rehabilitation
Implementation Responsibility:	MTRCA
Funding Responsibility:	province/municipalities
Additional Costs Range:	Option A : \$ 500-700 K/yr Option B : \$ 700-1000 K/yr Option C : \$ 25-35 K/yr Option D : project specific
Monitoring Requirements	routine sampling only
Reporting Requirements:	sites completed; area of eroding bank; annual sediment load estimates; annual costs
Timeframe:	Immediate; Option B requires 1 year site prioritization study
Potential for Delay	low
Potential Reasons for Delay	Resource constraints

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### COMPONENT ACTION #4.1.5:

### Improve Agricultural Controls to Reduce Sediment Production

Agricultural controls refer to those measures taken to modify farm management practices in order to achieve improvements in surface water quality. These include such things as soil conservation and runoff control measures. This section addresses water quality impairment from agricultural activities during wet weather conditions. Potential water quality impacts can also occur during dry weather periods and this is addressed under Component Action #3.3.1. In assessing agricultural impacts, the reader is urged to review both Component Actions.

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Agricultural impacts on surface water quality within the RAP watershed are most pronounced under wet weather periods. Despite the increasing urbanization within the Metro RAP watershed, there remains a need to encourage increased awareness among the agricultural community of the sources and impacts of agricultural pollution.

Based upon recent studies by the Conservation Authority, agricultural activities and associated water quality problems vary considerably throughout the RAP watershed. In the northwest portion of the RAP, in the Humber watershed, the extremely hilly terrain has resulted in a greater number of beef cattle operations being present. In these areas, runoff from feed lots and barnyard areas, as well as direct inputs from cattle watering in streams are the main sources of pollution. In other regions within the RAP jurisdiction, water quality concerns are more related to runoff occurring from row crop operations such as corn.

Stormwater runoff from farm fields and livestock operations can be an extremely concentrated pollutant containing high levels of bacteria, nutrients, and chemicals. Runoff samples collected on farms in the RAP watershed have contained faecal coliform bacteria in excess of 30 million/100ml of sample, more than 30,000 times the provincial objective for swimming. At these levels, even small amounts of this runoff reaching a stream can have significant downstream impacts.

Under wet weather conditions, water quality impairment can occur from the following sources:

### **A. Runoff from excessive or improper manure spreading adjacent to watercourses.**

#### Manure Spreading

Manure is a valuable agricultural by-product that should be put to use in farm operations. Applying manure in excess, or at the wrong time, or improperly handling it, will release nutrients into the stream as a pollutant. Surface application of "dry" or "solid" manure is the most common method used in the RAP area. The main nutrient, nitrogen, volatilizes when exposed to the elements. To minimize losses, manure should be incorporated within 2 days of surface application.

On reduced tillage or no-till cropping systems, liquid injection is the best method. It is also the most expensive method of application and works only with liquid manure systems. Conservation tillage to control soil erosion will not incorporate solid manure and therefore there is a high potential for losses due to volatilization and runoff.

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### Timing

Spring application is best for crop uptake. This is when it is most likely to be incorporated. Summer applications on grain stubble and cut fields are never incorporated and therefore will produce a higher runoff impact. Fall application is less desirable due to potential runoff and volatilization losses. This practice should be restricted to winter wheat and cover crops. Winter application, especially near drains and streams, or on slopes, is most undesirable.

### Application Rates

Farm operators, in most cases, spread closest to the barnyard to speed the "clean out" process. If nutrient rates are not taken into consideration and the same chemical application rate is used on spread and non-spread fields, the nutrient runoff potential increases.

### **B. Runoff from improper or excessive spreading of chemical fertilizers/pesticides.**

The degree to which chemicals are used in agriculture within the RAP watershed is not well documented. It is reasonable to expect that their use is much less than in southwestern Ontario. The most prevalent field crops within the RAP boundaries are corn and soy beans. The most common herbicides used on these crops are Atrazine (corn) and Sencor (soy beans). Pesticides are not generally used on these crops.

Herbicide loss to water courses occurs primarily during periods of runoff. The magnitude of runoff loadings to water bodies is governed by: the relative timing of applications and storm events; soil and chemical characteristics; topographic and geologic characteristics; and agricultural practices.

The application mode affects the amount of the chemical applied to the soil and thus the amount available to runoff. Spraying the soil surface directly, as with a pre-emergence herbicide, tends to make the chemical more directly available for runoff. Soil incorporation, on the other hand, will place much of the compound below the surface soil zone from which runoff is normally produced.

Application timing with regard to season and also to individual storm events is extremely important, especially for short-lived chemicals. Pesticides degrade in the environment. Therefore, the shorter the time between pesticide application and the hydrologic event producing runoff, the higher the probability that the pesticide will appear in runoff. Runoff potential is enhanced if pesticides are applied during times of the year when the probability of runoff-producing events is high. This is particularly true since antecedent moisture contents also tend to be higher during periods of high rainfall activity.

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It should be noted that it is during wet weather events when impacts from accidental spills will be greatest because the spill will be transported by the runoff. Even spills occurring some distance from the stream have the potential to enter the watercourse via surface runoff.

### **C. Runoff from livestock operations including feedlots, barnyard areas and manure storage areas.**

There is a great deal of literature regarding impacts of livestock wastes on water quality. Beyond direct cattle access, the other major source of water contamination from farming operations is overland runoff of precipitation which is not absorbed into the soil before reaching a watercourse. Runoff is considered contaminated when it contains bacteria and an excess of nutrients such as phosphorus and nitrogen. When rain falls directly into manure storage areas, not designed to contain runoff or into barnyards located too close to streams, contamination of the watercourse may result. Manure that is spread on frozen ground, may also result in the contamination of runoff and subsequent contamination of the watercourse.

For most operations, contamination of nearby streams with bacteria and excess nutrients, can be substantially reduced by incorporating as many of the following procedures and practices outlined in the Agricultural Code of Practice (OMAF publication) as possible:

- eavestroughing on barns/buildings to keep water from entering yards and storage areas
- divert clean rainfall and snowmelt away from yards/storage areas by ditches, berms, and drains
- scrape yards as often as possible to reduce the amount of manure available for runoff
- roofing in a portion of the yard will keep out rainfall that promotes runoff
- retaining walls around yard/storage will retain the liquid effluent
- a manure storage capacity of 200 days to dismiss the need for winter spreading
- incorporate manure within 24 hours after spreading to avoid contaminated runoff
- avoid applying manure within 20 feet of a streambank or on floodplains
- avoid spreading manure on steep slopes.

### **D. Soil Erosion**

Soil in a watercourse destroys aquatic habitats, alters the composition of aquatic environments, and decreases channel capacity.

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Erosion and sedimentation processes usually result in the transport of chemically active fine particles and organic matter while leaving coarser material behind. The fine particles and organic matter can concentrate nitrogen, phosphorus, organic mercury, PCB's, bacteria and heavy metals. Soil particles can also carry herbicides, insecticides, and fungicides. All of these materials can have serious short and long-term effects on aquatic ecosystems and the organisms (including humans) that depend on them for food.

As rain falls it strikes the soil with considerable energy. This energy can disperse soil aggregates and cause the soil surface to puddle and seal, reducing the amount of water that can enter the soil. Management practices that help to form water - stable aggregate that maintain their slope and an open soil surface will help the water enter the soil and reduce runoff. Crop rotation is important. Many crops such as winter wheat, spring grains, perennial grasses and legumes and cover crops help to form these aggregates and they are an excellent addition to any rotation, particularly on heavier soils.

### Existing Programs

The Ontario Ministry of Agriculture and Food (OMAF) is the lead agency for agricultural control programs, being responsible for a number of initiatives which include agricultural drainage and erosion control. Information and education extension services are provided by OMAF through agricultural representatives and agricultural engineers which serve the farming community. This staff forms a vital "grass roots" link in attempting to promote the goals and objectives of OMAF programs. The two key OMAF programs by which staff service the farming community are scheduled for termination in 1990. It is anticipated, however, that replacement programs are inevitable and will be patterned after these existing programs. A brief description of existing programs is provided below.

#### **A. The Ontario Soil Conservation and Environmental Protection Assistance Program II (OSCEPAP II)**

The Ontario Soil Conservation and Environmental Assistance Program (OSCEPAP II) is administered by the Ministry of Agriculture and Food. The purpose of OSCEPAP II is to provide grant assistance for controlling agricultural soil erosion, sustaining crop productivity and protecting water resources. This was a \$22 million program, funded by the Ontario Ministry of Agriculture and Food (OMAF) to run from April 1, 1986 to March 31, 1990. The program consists of two sections: Soil Conservation; and Environmental Protection. The main difference between this Program and the Land Stewardship Program described below, is that OSCEPAP II is single-ended and "one-shot" in nature. Each farm operator is eligible for a one-time grant to a maximum of \$10,000 for soil conservation projects, and \$7,500 for environmental protection projects.

Of the \$22 million allocated across the Province, a very small amount was applied for by farmers within the Metro RAP boundaries. According to recent figures by the York Region

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OMAF office, 11 farmers applied for, and received \$41,015 in financial assistance since 1986. This level of uptake is probably low in comparison to other areas in southern Ontario. The reasons for this are related to farming on the urban fringe and are discussed under Component Action # 3.3.1.

### **B. Land Stewardship Program**

The Ministry of Agriculture and Food's Land Stewardship Program is a \$40 million, three year initiative which is scheduled to end in September 1990. Of the \$40 million, some \$31 million is in the form of incentive grants to farmers, with smaller amounts to be spent on research projects, extension education and program delivery. Grants are provided for the adoption of management practices that will reduce soil erosion and compaction, restoring soil organic matter and structure and minimizing potential environmental contamination. Funding for the Land Stewardship Program is divided equally on a county/district basis. A local committee established by the Ontario Soil and Crop Improvement Association (OSCIA) reviews and recommends projects for funding. Project approval is based on a formula using row crop acreage. Each local OSCIA committee is comprised of a committee chairman, three committee members, and one field inspector, who are all farmers in the community.

As in the case of the OSCEPAP II program, application numbers are lower within the RAP area than in other southern Ontario regions. Total participation within the RAP watershed has amounted to 29 farmers for a total grant expenditure of \$76,789.

Both of the OSCEPAP II and the Land Stewardship Program are administered by OMAF Agriculture Engineers, and Agricultural Representatives and Soil Conservation Advisors. An Agricultural Representative is viewed as a resource person responsible for answering questions on a county-wide basis. Recently, the area of specialization has widened to begin including financial aspects of agriculture. Agricultural Engineers are primarily involved in the engineering aspects of farm management practices such as grassed waterways and manure storage areas. Soil Conservation Advisors are the technical experts on soil conservation issues and are responsible for administering all Land Stewardship applications. Within the RAP watershed, there are two agricultural representatives, one agricultural engineer, and one soil conservation advisor. These staff are responsible for the entire regions of Peel and York and, in fact, devote the majority of their time to areas outside the RAP watershed.

Across the Province, OMAF allocates its OSCEPAP II funding on a first-come, first-served basis. This approval process has typically resulted in wide disparity in funding allocation from region to region, since program uptake is greater in the more intensive agricultural areas in southwestern Ontario. The same situation applies for the Land Stewardship Program. In assessing the effectiveness of both programs, the most useful comparison regarding program uptake would be the proportion of applications relative to the number of farmers in a given area. Agriculture and Food does not compile these statistics but, based upon discussion with

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MTRCA staff, it is likely that on a per unit basis, the number of applications is low within the RAP area. A number of impediments exist which affect program uptake within the RAP area and these are described in greater detail elsewhere under Component Action #3.3.1 (Dry Weather Agricultural Impacts).

It is difficult to quantify the success of existing programs in terms of water quality. Within the RAP watershed, the Conservation Authority's Rural Beaches Project (to be discussed later in the section) has compiled some water quality data suggesting that marked local improvements in stream water quality may be realized if projects such as manure storage facilities or limiting in-stream cattle access are implemented. On a broad watershed basis, however, the Environment Ministry's routine water sampling network is simply not designed to document changes to water quality at a site-specific level. There are no provisions within either the OSCEPAP II or Land Stewardship Program for water samples to be collected.

### **C. Rural Beaches Program**

Since 1985, the Ontario Ministry of the Environment has sponsored an initiative entitled The Provincial Rural Beaches Program. This initiative was prompted by the increasing number of swimming beaches being posted by the Ministry of Health in rural areas in southern Ontario. The Ministry designed the program to utilize the benefits and knowledge of local conservation authorities. Funding has been granted to conservation authorities based upon evaluations of written proposals submitted to the Provincial Rural Beaches Committee comprised of representatives from MOE, OMAF, and the Conservation Authorities Branch of MNR.

Since 1986, the MOE has provided \$225,000 in funding to The Metropolitan Toronto and Region Conservation Authority (MTRCA) to design and conduct studies on three watersheds which have suffered from swimming closures in the past. Studies are ongoing in the Centreville Creek, the East Humber River, and the Bruce Creek, all located in the more rural areas of the RAP watershed.

The Rural Beaches projects are studies only and do not as yet have an implementation aspect to them. Their intent was to evaluate the agricultural sources of water quality impairment and develop remedial strategies for improvement. The Conservation Authority's project will result in a final document which will identify farm remedial measures and costs, for the specific study areas. This will be submitted to the MOE for consideration in spring 1990.

A significant component of the MTRCA's Rural Beaches Project has involved personal contact with farm operators. It was found, through these contacts, that many farm operators had relatively little knowledge of Agriculture and Food's programs or had ever been contacted by their staff. While most farmers were reluctant to spend large amounts of money on remedial measures, many felt that farms were contributors to water quality impairment and that some portion of remediation costs should be borne by the farm operator.

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### Potential Program Improvements

A range of potential improvements for agricultural programs has been documented under Component Action # 3.3.1. (dry weather agricultural sources). These improvements would reduce agricultural impacts under both dry and wet weather conditions. The program improvements addressed under dry weather agricultural impacts include:

- a) Develop Individual Farm Remedial Plans;
- b) Develop Improved Financial Assistance Program;
- c) Develop Improved Education Program (Rural Clean Water Program);
- d) Develop Legislation;
- e) Abatement.

In addition to improvements proposed for these categories in Component Action # 3.3.1 the improvements would assist efforts to address wet weather impacts.

#### **A. Subsidize Barnyard and Manure Storage System Improvements**

Based upon an estimate of 125-250 farms within RAP boundaries:

Total cost:       \$50,000/farm X number of farms = \$6,250,000 to \$12,500,000.

As is described under Component Action #3.3.1 (dry weather impacts), the recommended subsidy should be 90% with a ceiling of \$50,000.

#### **B. Subsidize Barnyard Water Diversion Projects**

Based upon an estimate of 250 to 500 farms which may require barnyard diversion projects:

Total cost: \$12,500/farm X number of farms = \$3,125,000 to \$6,250,000.

As under A. above the recommended subsidy is 90% to a ceiling of \$12,500.

As discussed under Component Action # 3.3.1, existing subsidy levels for agricultural programs are not sufficient to encourage program uptake in areas like the Toronto RAP which are on the urban fringe. In its' Clean Up Rural Beaches (CURB) report to Environment Ontario, it is expected that MTRCA will recommend increases in subsidy levels from 66% to 90%, with a corresponding increase in ceilings, for a period of five years. After the five year period has elapsed, improvements would be required, by regulation. The MTRCA's proposed recommendation would require both an increase in resources and new legislation and approval by provincial agencies would be by no means certain. The scenario represents the highest

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potential cost to the RAP however, and so it has been used as the basis for estimating costs for agricultural improvements.

The total RAP cost would be dependent upon whether or not a new financial assistance program is offered similar to the OSCEPAP II program. Assuming that this occurs and that the grant level would be similar to 66% used in the past the RAP costs would be those funds required over and above the 66% to bring the subsidy up to the 90% level. On the basis of the estimates provided above this would amount to:

Barnyard and Manure Storage: \$ 2,125,000 to \$ 4,250,000 (over 5 years)

Barnyard Water Diversion: \$ 1,062,500 to \$2,125,000 (over 5 years)

It is assumed that since the benefits to be received from increased uptake of subsidies would accrue primarily to rural municipalities, that the cost of these improvements would be the responsibility of municipalities within the Regions of York and Peel.

### Potential Program Benefits

Refer to Component Action #3.3.1

### Dependent Projects

Refer to Component Action #3.3.1.

### Monitoring Requirements

Refer to Component Action #3.3.1.

### Reporting Requirements

Refer to Component Action #3.3.1.

### Implementation

Agreement must be reached with respect to increased subsidy level and financial responsibility. Without changes in the subsidy formula response to the programs is likely to remain at low levels. The funding level suggested (90%) is very high and may be resisted by both provincial and municipal agencies.

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### Potential Delays

Delays are anticipated pending a decision on renewal of existing subsidy programs and negotiation of new funding arrangements.

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### Summary Information for Implementation

Component Action:	Agricultural Wet Weather Controls
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Agricultural Dry Weather Controls
Implementation Responsibility:	MTRCA/OMAF/MOE
Funding Responsibility:	OMAF/Municipalities
Additional Costs Range:	Option A : \$2.1-4.3 M over 5 years Option B : \$1.0-2.1 M over 5 years
Monitoring Requirements:	Bacteria and nutrients at selected sites
Reporting Requirements:	number of applicants farms contacted projects undertaken/costs
Timeframe:	immediate
Potential for Delay	high
Potential Reasons for Delay	unwillingness to increase subsidy levels

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### REMEDIAL ACTION #4.2:

#### Implement River Basin Plans for Water Quality

The rivers draining the Toronto RAP area are a major resource to the entire population of the region, providing open space and recreational opportunities. The rivers however receive the runoff from the land surface which carries contaminants capable of degrading the resource and diminishing its value. The rivers are impacted directly and also act as efficient conduits to transmit contaminants to the lake. All land uses and actions on the land within the RAP

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watersheds contribute to these problems. The rivers in the Toronto area are more severely effected than in many urban areas because of the extent of existing development and the continuing growth in the upper watersheds.

The lower reaches of all of Toronto's watersheds have been degraded through development. Conversion of the forest first to agriculture, and then to an urban environment, has led to increases in temperature, in-stream erosion, sediment production and chemical contamination. The riverine fishery is most severely impacted on a continuing basis by changes in physical habitat and non-toxic water quality problems such as temperature and suspended sediment. Intermittent releases of toxic substances, as a result of poor handling and release of industrial and domestic chemicals to storm sewers, and spills, have a severe, but short-lived, effect on the fishery. Urban runoff, with its high concentrations of heavy metals, represents a significant, but intermittent, stress on the riverine fishery. Urban runoff frequently leads to exceedences of the PWQO, but the association of the toxic contaminants with suspended solids diminishes their availability to fish. As a result, the abundance and diversity of fish species is more strongly affected by temperature than by toxic chemicals in rivers. The significance of urban runoff in terms of toxic impacts is greater in depositional areas, such as the river mouths and the lake, where contaminated sediments accumulate and where bioaccumulation can be a factor.

Bacterial contamination is also a concern in our rivers. Inputs from domestic and wild animals, and incorrectly connected sewers, lead to exceedences of provincial water quality objectives, even during dry weather. During and after rainfall events the rivers become highly contaminated with bacteria and impact many of the beaches along the lake. Because of the time required for runoff to flow from the top of the watersheds to the lake, these riverine influence can be felt for days after it has stopped raining.

Our rivers have received special attention over the last decade in recognition of these problems. In 1981 the Toronto Area Watershed Management Strategy (TAWMS) was initiated in order to provide a clearer definition of water quality problems and to develop cost-effective solutions for Toronto Area watersheds, with particular emphasis on the Don and Humber Rivers, and Mimico Creek. TAWMS was the first major effort to enlist all levels of governments in developing solutions to water pollution problems. It also represented a step towards an ecosystem approach by looking at entire watersheds rather than simply sections of river within a particular municipal jurisdiction. The TAWMS Steering Committee, consisting of representatives from Environment Canada, Environment Ontario, the Ministry of Natural Resources, MTRCA, and the local and regional municipalities produced the Humber River Water Quality Management Plan (1986) and the Strategy for Improvement of the Don River Water Quality (1989).

TAWMS provided the basis for many of the Component Actions contained in this document. The implementation arm of TAWMS resulted in numerous remedial actions which have been ongoing since 1984 and led to the Waterfront Water Quality Improvement Program

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(Component Action # 1.3.1) which provides enhanced funding of water pollution control projects within Metro. Since 1984, the province, and Toronto's municipalities have spent about \$50 million on studies and remedial works.

The TAWMS terms of reference did not include the Rouge River within its study area. In 1986 MTRCA initiated the Rouge River Urban Drainage Study. Patterned after an evolved form of TAWMS which involved both government agencies and public groups, the ensuing study resulted in the "A Comprehensive Basin Management Strategy for the Rouge River Watershed", published in June 1989.

The restoration and protection of riverine habitat will require both a general reduction in the urban impacts on water quality and development of comprehensive strategies for fisheries management and habitat rehabilitation. Improvements in water quality alone are not likely to yield major improvements in the fishery resource in urban streams. The river basin plans and strategies for the Humber, Don and Rouge rivers provide a strong basis for the actions required. The Humber plan, because it was completed first, needs to be strengthened and extended to be more ecosystem-oriented. The Don and Rouge plans are currently strategic in nature and require decisions and priority setting to allow their implementation. The Metro Toronto RAP provides a mechanism to turn these plans into scheduled actions.

### COMPONENT ACTION #4.2.1:      Continue Implementation of the Humber River Water Quality Management Plan

From 1982-86, a detailed study of the Humber River was carried out. The Humber River Management Plan prepared by the TAWMS Steering Committee (chaired by MOE with representatives from all participating municipalities and the MTRCA) was released to the public for its review and comments in July 1986 and was successfully endorsed.

Study results indicated that bacteria, and heavy metals, principally lead, zinc, copper and cadmium, are of primary concern. In addition, contaminants from industrial and residential uses impact the river. Bacteria and heavy metals exceed the Provincial Water Quality Objectives (PWQO) at the Metro Toronto boundary, indicating the need for pollution control efforts in the upper basin. The urban basin is, however, the predominant source of both dry and wet weather contamination.

During dry weather, a limited number of storm sewers contribute bacteria and excessive levels of heavy metals, because of illegal sanitary connections and industrial inputs. During wet weather, combined sewer overflows and stormwater discharge contribute severe loadings of both metals and bacteria. Inappropriate disposal of household hazardous contaminants and industrial residues to the storm sewer system results in intermittent contamination (Humber River Water Quality Management Plan, 1986).

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### Existing Programs

The Humber River plan contained fourteen recommendations for remedial programs, with required actions being divided into two phases. In most instances, phase 2 programs were to represent extension of phase 1, pilot scale programs, to the entire watershed, if pilot level results justified this.

The Humber recommendations, with the exception of the one dealing with basement flooding (Recommendation #10) are discussed in detail under various Component Actions in this document because of their applicability to all watersheds within the RAP area. A very brief summary of progress on the recommendations is provided below together with a reference to the Component Action. The reader is referred to the Component Action for detailed information.

- 1) Catchbasin Cleaning:   - Etobicoke has increased cleaning frequency  
                                  - See Component Action # 4.1.1
- 2) CSO Control :           - Capacity studies of Humber STP complete  
                                  - Bill 53 (allows Metro to subsidize CSO tanks) passed first reading in July  
                                  - Metro has developed a preliminary CSO policy, to be presented to Council  
                                  - Keele Street Trunk design is to examine ability to provide capacity necessary to retain CSO on the Humber  
                                  - See Component Action # 2.2.1
- 3) Dry Weather Sources:   - Tracing and disconnection programs continue under WWQIP  
  (Sanitary Connections)   - See Component Action # 2.2.2
- 4) Dry Weather Sources   - Tracing study on Humber River completed in 1988  
  (Industrial Sources)      (See Component Action # 3.1.1)  
                                  - Model Sewer Use by-law completed by MOE; being adopted by Metro; See Component Actions : 2.2.3; 3.1.2; and 3.1.3  
                                  - MISA Sewer Use Program being developed  
                                  (See Component Action # 2.3.1)
- 5) Stormwater Ponds:     - limited progress, until recently no agency has been prepared to  
                                  be proponent  
  (Industrial areas)       - Environmental Assessment will be required  
                                  (See Component Action # 4.3.2)  
                                  - Interim Stormwater Quality Guidelines released for public review  
                                  (See Component Action # 4.3.3)

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- 6) Stormwater Ponds: Phase 2 only - no action to date  
(Residential areas)
- 7) Dry Weather Sources: - Metro tracing program found 18 establishments with poor  
(dumping) handling practices; corrective action taken  
(See Component Action # 3.1.1)  
- Metro/MOE undertaking demonstration project to establish  
criteria for industrial Best Management Practices Plans  
(See Component Action # 3.1.3)
- 8) Household Hazardous Contaminants: - Metro has expanded number of depots accepting wastes to ten  
- "Toxics Taxi" service for pick up of wastes instituted  
(See Component Action # 3.2.1)
- 9) General Contaminant Reduction: - Continued enforcement of existing municipal by-laws  
(See Component Action # 4.1.2)  
- river cleanup through SCOUR  
(See Component Action # 5.3.1)
- 10) Flood Reduction : - Ministry of Transportation subsidy formula changed to allow  
funding of local detention tanks as an alternative to sewer  
separation  
- Specific projects continue to be funded under WWQIP
- 11) Sediment Control Programs: - Continuing efforts by MTRCA  
(See Component Actions: 4.1.3, 4, 5)
- 12) Rural Controls: - Continuing efforts through MTRCA  
(See Component Actions 3.3.1 and 4.1.5)
- 13) River Monitoring: - Continued regular monitoring  
- No enhancement due to lack of progress on pilot ponds
- 14) Fisheries Programs: - no urban projects undertaken due to lack of progress on pilot  
water quality projects  
- pilot projects being conducted on temperature reduction in the  
upper Humber

Progress on the implementation of the Humber River plan has been variable. The progress which has been made under some programs has been matched by efforts on other Toronto

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watersheds. The Humber River plan, through continued TAWMS involvement has led to general improvements in municipal practices across Metro.

Improvements have been noted primarily in "housekeeping" types of programs, especially those under the WWQIP program, which provides an enhanced provincial subsidy. There have been improvements made by municipal governments in programs with a high degree of public support, such as household hazardous wastes. There has been movement in programs which will eventually come under regulation through the MISA program.

There has been limited progress in programs such as storm water pilot ponds, partly due to a lack of identified resources, but more importantly, the unwillingness of any agency to take on proponentcy, because the perceived burdens of Environmental Assessment and long-term maintenance. Finally there has been limited progress in areas of provincial and Conservation Authority jurisdiction because of limitations imposed by budgets and staff resources.

### Potential Program Improvements

Potential improvements outlined under the various Component Actions cited above would contribute to the program to remediate the Humber River. One of the objectives of RAP implementation will be to ensure a consistent application of pollution control programs across all municipal jurisdictions, ensuring that the benefits of the programs will be seen in all of the river basins and across the entire waterfront.

Certain additional improvements can be undertaken however, in relation to the Humber plan specifically. The potential improvements are applicable to the Humber River plan, but should also be considered in regard to the other river basins within the Metro RAP area.

#### **A. Upgrade the Humber River Water Quality Management Plan to Ensure Consistency with Actions to be Taken in Other River Basins**

The Humber River Water Quality Management Plan was the first plan established under TAWMS. It reflects a strong orientation towards source remediation, but contains few recommendations relating to habitat improvement, fisheries enhancement, or public use. The strategies for the Don and Rouge rivers reflect these aspects to a far greater extent and the goals established for the RAP require attention to these areas. A specific revision of the Plan is not required because actions incorporated in the RAP will be applicable to all river basins within the study area. Prioritization of projects across the RAP area should reflect the need for a balanced allocation of resources to ensure progress in each basin.

No costs are provided for this improvement as they are reflected under the various Component Actions. The allocation and scheduling of resources will consider the entire RAP area, and will reflect consultation with the Public and Technical Advisory Committees.

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### **B. Resolve the Issues of Ownership, Proponency, and Environmental Assessment for Retrofitted Remedial Works**

It has been established in the Humber River studies, as well as those conducted on the Don and Rouge rivers, that control of stormwater and CSO from existing development will be necessary if restoration of our rivers (especially in the lower reaches) and the lake are to be achieved. While redevelopment will provide the most cost-effective opportunities to correct problems and create an improved urban ecosystem, the pace of redevelopment will be very slow in some areas. There may therefore be a need to retrofit water quality controls, such as stormwater ponds or CSO storage facilities in priority areas which are not subject to redevelopment pressure.

The proposed Emery Creek Pilot Pond, recommended in the Humber plan is an example of a retrofit situation. Details of this proposed project are discussed under Component Action # 4.3.2. Efforts to initiate this project have not been successful because of circumstances which will be common to many retrofit situations. These circumstances include:

- there are multiple jurisdictions involved, with MOE advocating the need for a pilot facility, the site being located in North York, in a park area operated by Metro, within the floodplain regulated by MTRCA.
- the Environmental Assessment Branch has advised that the facility, as an extension to an existing storm sewer system will be required to fulfil the requirements of either a Class B or C Environmental Assessment, depending on whether it is municipal or provincial proponency.
- the pond is to be constructed as a pilot project, but will be a permanent facility with the normal associated maintenance requirements. Since this could be the first of many such structures, the potential cost implications for long term maintenance could be significant.

Metro Toronto Works has recently agreed to accept proponency for this facility if the Province will provide 85% of the cost. Metro has further recommended that a similar pilot pond be constructed on the Don River. The Ministry is currently seeking funding for these facilities.

One difficulty in implementing projects of this sort, is the lack of experience with retrofit water quality controls. The issues of facility design, ongoing maintenance, operational responsibility and monitoring need to be resolved. A prototype EA process which minimizes delay, while protecting the interests of local residents needs to be established. The implementation of these pilot projects provides an opportunity to develop guidelines which will form the basis for future retrofit controls.

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A potential improvement to the existing situation would be to ensure that funds are provided to allow implementation of a number of pilot projects, similar to the Emery Creek pond, on each of the major watersheds and in each of the regions. The intent would be to involve as many municipalities as possible and provide opportunities for geographically based public involvement. Stormwater ponds, possibly in conjunction with stream and habitat improvement would be the most likely candidates for pilot projects.

The costs associated with this improvement are provided under Component Action # 4.3.2. The total commitment by all agencies would be about \$ 10 million for six pilot projects to be constructed over the next 3 years. No annual operating costs have been included as it is assumed that the pilot projects would become permanent facilities, forming part of the stormwater pond system, costed under Component Action # 4.3.4.

### **C. Replace the Humber River Implementation Committee with a Municipality-Chaired Implementation Committee**

The Humber River Implementation Committee was established in 1988 to co-ordinate the activities of the existing agencies in implementing the water quality management plan. The committee consists of members from implementing agencies and basin municipalities. It was to deal with the scheduling and implementation of recommended control options, modifications to recommendations as required, and recommendations regarding implementation of Phase 2. Municipal membership on the Committee was sought from Metro municipalities and the Regions of York and Peel. The Regions declined to participate due to staff workload and other priorities.

Environment Ontario chairs the Committee, through Central Region, but no staff resources have been made available to shepherd implementation. Further, the Ministry is a regulatory agency and a potential source of provincial subsidies, but it is not an implementing agency in most cases, as it does not construct, own or operate facilities. Coordination of the Implementation Committee has been hampered by the limited staff resources, combined with problems of retrofit implementation especially in regard to proponency and ownership.

Metro has recently established the Water Quality Improvement Coordinating Committee (WQIIC), which is intended to oversee implementation of projects called for as a result of TAWMS or the RAP. Operating as a subcommittee of the RAP technical advisory committee, the WQIIC will have access to other municipalities and agencies outside Metro as needed. The Committee will be able to receive input from the public and interest groups, through the RAP's public advisory committee. The WQIIC will replace the Humber River Implementation Committee and will also oversee implementation on Metro's other watersheds and the waterfront. The establishment of this committee should have a positive impact on overall implementation because the committee will now be chaired by an agency responsible for implementation rather than simply funding (ie the province).

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No additional costs have been established for this improvement at this time. Major costs for implementation are provided under the various Component Actions.

### **D. Provide Additional Staff as River Basin Coordinators to Promote Implementation on Individual Watersheds**

Each of the major river basins in the Toronto area will require significant remedial action in order to meet the RAP's goals. The RAP's Public Advisory Committee (PAC) has been explicit in addressing the importance of the watersheds, in addition to the waterfront, in establishing the RAP goals. Further, each major watershed represents an ecological system or unit.

A potential improvement would therefore be to establish each major watershed as a sub-RAP area and to provide staff to coordinate the implementation of RAP programs within each. The staff would provide a geographical orientation to RAP implementation which would be allow an improved ability to take advantage of local public support, and focus the efforts of local municipalities. Actions on each watershed would be subject to the overall RAP strategy and priorities, and the RAP would continue as the driving force in terms of securing commitments and negotiating funding. The watershed staff would work within the RAP framework, concentrating on the detailed implementation of projects.

There are three major watersheds, three smaller watersheds, and the waterfront within the RAP area. It is anticipated that a permanent staff of five, in addition to RAP staff would be required to actively promote implementation. Staff should be hired through either Environment Ontario, the Ministry of Natural Resources, or MTRCA, as these agencies have mandates which require attention on a watershed basis. For the purposes of this document, it is assumed that the provision of staff resources would be through Environment Ontario. It is anticipated that the provision of this staff would cost about \$325 K annually for salary, benefits, expenses, and office space.

### **Potential Program Benefits**

The benefits cited in the Humber River Water Quality Management Plan are provided below for the remedial actions proposed under Phases 1 and 2 of the plan. The benefits of pilot scale projects conducted under Phase 1 will be limited in an overall sense, because of the small scale of control. The pilot projects were included in Phase 1 because the ecological benefits of some remedial measures were not quantifiable for river uses (eg. contaminant reduction to levels which continue to exceed the PWQO). The results of the Humber study indicated that even with full implementation of all options, the PWQO would continue to be exceeded on occasion, although the frequency and duration of exceedence would be reduced. Part of the purpose of the pilot sites was to demonstrate quantifiable benefits, in order to ensure cost effectiveness before proceeding with full scale implementation.

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Implementation of the Humber River Plan would have quantifiable benefits in terms of load reduction to the Lake. The Humber Plan cites load reductions (from urban sources) of between 44 and 86 % for different heavy metals. Further, it was concluded that faecal coliform bacteria counts could be reduced to below the 100/100 ml recreational use criteria during dry weather, at the river mouth. The criteria would continue to be exceeded under wet weather conditions, but the total loading to the waterfront would be reduced. A more detailed evaluation of benefits is provided in the Humber River Water Quality Management Plan report.

### PHASE 1:

- 1) CSO Control :
  - lessens public health risk
  - reduces stress on fishery in the lower reaches
  - reduces source of contamination for Humber Marsh and the Lake
  - improves aesthetics, enhances recreational enjoyment
- 2) Flood Reduction (local detention tanks):
  - reduces frequency of basement flooding
- 3) Catchbasin Cleaning:
  - reduces stress on the fishery throughout basin
  - provides impetus for investigation of fisheries improvement programs
  - reduces metal load to Humber Marsh and the Lake
  - improves aesthetics, enhances recreational enjoyment
- 4) Dry Weather Sources (Sanitary Connections)
  - lessens public health risk
  - PWQO achieved in the lower reaches during dry weather
- 5) Dry Weather Sources (Permitted Discharge)
  - provides localized improvement in fishery habitat (spawning)
  - reduces pollutant accumulation in the Marsh and Lake
- 6) Dry Weather Sources (dumping and poor handling of wastes):
  - reduces potential for acute stress to the fishery
  - reduces pollutant accumulation in the Marsh and Lake
- 7) Household Hazardous Contaminants:
  - reduces the potential for intermittent fish kills
  - reduces source of contamination for Humber Marsh and Lake
  - improves public awareness

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### 8) Dog and Litter Control:

- lessens public health risk
- enhances recreational enjoyment
- improves public awareness

### 9) Sediment Control Programs:

- reduces stress on fishery
- provides impetus for fishery habitat improvement
- reduces accumulation of sediment, nutrients and toxic substances in Humber Marsh and the Lake

### 10) Rural Controls:

- lessens public health risk
- reduces accumulation of sediment, nutrients and toxic substances in Humber Marsh and the Lake

### 11) Disinfection:

- decreases dry weather FC counts between Emery Cr. and Black Cr.
- lessens public health risk
- allows detailed evaluation of the capabilities and flexibility of dry weather disinfection
- allows evaluation of the feasibility of disinfecting wet weather flow

### 12) Stormwater Ponds (existing areas):

- reduce PWQO violations locally
- reduces potential for acute toxic impacts on fishery
- provides impetus for parallel fishery habitat project
- allows improved quantification of the fisheries benefits of stormwater control
- allows evaluation of watershed specific load reductions for metals, nutrients and sediment

### 13) Stormwater Ponds (new development):

- reduces future degradation of the watercourse
- reduces future contaminant loads to the lake
- allows evaluation of fisheries impacts in less stressed environments
- allows evaluation of load reductions in developing areas

### 14) Enhanced Water Quality Monitoring:

- allows evaluation of overall Phase 1 effectiveness
- allows evaluation of specific fishery improvements

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### PHASE 2:

- 1) Disinfection (low flow):
  - reduction of dry weather FC counts
  - lessen public health risk
- 2) Disinfection (retained stormwater):
  - reduction of wet weather FC counts
  - lessen public health risk
- 3) Industrial Ponds (existing areas):
  - improved fishery
  - major reduction in loads to lake
  - major reduction in PWQO violations
  - spill control
  - aesthetic improvements
- 4) Residential Ponds (existing areas):
  - as above
- 5) Ponds (new development):
  - as above
  - prevent future degradation of fishery

The four potential improvements discussed are intended to upgrade the effectiveness of remedial action implementation.

### Dependent Projects

The majority of Component Actions documented in this report would contribute to remediation of the Humber River. The overall selection and prioritization of actions will have a similar impact on each of the watersheds. Certain of the Component Actions are of are more important in the Humber basin than in some of the other basins. Component Actions with a greater significance to the Humber are listed below.

- Humber Bay STP Expansion (CSO control)
- Development and Agricultural Controls (large non-urban upper watershed)
- CSO control
- Stormwater Program
- Stream and Habitat Improvement (Black Creek)

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The potential improvements to the Humber River plan, cited in this document, are not dependent on any other Component Action except in terms of competition for available resources.

### Monitoring Requirements

The overall monitoring strategy to be developed under RAP will provide the necessary information to gauge overall progress of all remedial measures. Special monitoring requirements will be incorporated into the pilot projects in order to determine the effectiveness of the measures.

Routine fixed-station monitoring is currently carried out on average of once a month at various locations on the Humber River, with more intensive sampling proposed for the summer months. Sediment sampling at the mouth of the river is carried out twice a year, with centrifuging in the spring and benthic sampling in the fall.

### Reporting

Reporting on the various Component Actions comprising the elements of the Humber River Plan will be as per the specifications under the individual component actions. Part of the terms of reference for the WQIIC (potential improvement C) calls for the establishment of a data management system to track results and document status and trends. This system will be developed with a RAP context so that reporting procedures are common throughout the RAP. If potential improvement D is selected for implementation, it is anticipated that annual reports documenting actions and progress on each major watershed, would be prepared by the basin coordinator.

### Implementation

Implementation of actions on the Humber River will be subject to the schedules determined for the overall RAP. Many of the "best management practices" actions have been implemented already. A three year time frame is anticipated to ensure that all elements of the Phase 1 recommendations have been commenced.

### Potential Delays

The main areas of potential delay involve CSO and pilot projects. Control of CSO in the Humber River basin is dependent upon STP capacity at the Humber STP. Expansion of the Humber and Main STPs will require a major percentage of the total resources identified in this report. The scheduling of resources will likely influence the timing of CSO implementation.

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CSO actions, STP expansions and pilot projects will all be subject to Class Environmental Assessments. Consultative efforts under the RAP are expected to reduce delays to some extent, but the RAP will not be dealing at a level of detail consistent with the concerns of local residents. There is a potential for delay for each of these types of action therefore, if "bump-up" requests are made. The Eastern Beaches Tanks project conducted by the City of Toronto resulted in a construction delay of one year due to concerns raised during the Class EA.

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### Summary Information for Implementation

Component Action:	Humber River Water Quality Management Plan
Priority of Remedial Intent:	high
Priority of Component Action:	high
Related Programs/Projects:	almost all Component Actions
Implementation Responsibility:	municipalities, province
Funding Responsibility:	municipalities, province
Additional Costs Range:	Specified under Component Actions Improvement D: \$325 K annually (province)
Monitoring Requirements	RAP Monitoring, pilot site requirements
Reporting Requirements:	annual RAP report; Basin report under improvement D
Timeframe:	option dependent
Potential for Delay	option dependent
Potential Reasons for Delay	Resources Scheduling Environmental Assessment

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### Reference Documents

1. Humber River Water Quality Management Plan, 1986.

There are 15 technical reports and 28 working documents related to the Humber River under the TAWMS program.

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### COMPONENT ACTION #4.2.2:

### Continue Development of the Don River Water Quality Management Plan

Water quality in the Don River is severely degraded throughout most of the watercourse. Ontario's Provincial Water Quality Objectives have been exceeded for a wide range of parameters including heavy metals, nutrients, bacteria and some organic compounds. Pollutant concentrations tend to be higher near the mouth of the river due to higher levels of urbanization and the presence of a sewage treatment plant and combined sewer overflows.

Much of the river's pollution is attributable to diffuse urban sources, especially storm runoff, illegal connections and spills to sewers. The river receives runoff from more than 1,400 outfalls, including 872 storm sewer outfalls and 30 combined sewer outlets within the boundaries of Metro Toronto. There are no direct industrial discharges to the Don River.

Pollution concentrations generally increase by a factor of 1 to 3 from the upstream to middle reaches and by a factor 1 to 10 from the middle to lower reach. Massey Creek a heavily urbanized catchment draining portions of Scarborough and East York has concentrations of pollutants approximately 2 to 10 times higher than the upper Don.

Concentrations of pollutants tend to be lowest for dry weather conditions and increase by a factor of 1 to 30 for storm events. The dominant source of pollution during wet weather events are discharges from storm sewers.

In the past, various abatement works and monitoring programs were carried out on the Don River. These measures resulted in reductions in total phosphorous and biochemical oxygen demand and improvements in dissolved oxygen conditions. Recent abatement efforts have focused on the identification and removal of illegal sewer connections, spill controls and the installation of stormwater management facilities.

Since 1981, the Don River has been studied extensively by Environment Ontario, as part of the TAWMS study. In 1988 consultants were hired to carry out a three-phase water quality management study. The three phases involved the definition of water quality problems and development of study objectives; evaluations of effective control options and the formulation of improved strategies leading towards the attainment of various levels of water quality improvement.

Some of the remedial and mitigative measures considered in the Strategy included:

- installation of combined sewer overflow controls
- incorporation of stormwater quality ponds
- prevention of stormwater contamination at the source
- sewage treatment plant upgrade or decommission

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The Don River Water Quality Improvement Strategy released in September 1989, incorporated findings from investigations of low flow and storm events conditions, snow melt, the status of biological communities and dry weather conditions. Findings were presented as staged management strategies designed to restore a range of beneficial uses. Options for water quality improvements investigated ranged from no further degradation to the full restoration of water quality.

### Existing Programs

The Don River strategy indicated options and costs but did not seek to select the desired level of improvement. The level of improvement to be pursued is to be determined within the broader context of the RAP, in consultation with the public, municipal and agency staff. The Don River strategy report was provided to the RAP's Public Advisory Committee in September of 1989.

The levels of potential improvement considered in the Don River study are outlined below. Each level requires an increasing commitment of resources and timeframe. As will be discussed later, it is noteworthy that level 1, which seeks only to maintain the status quo, is not a "do nothing" alternative and requires a substantial increase in resources.

<u>Level</u>	<u>Level</u>	<u>Water Quality Parameters of Concern</u>	<u>Degree of Water Quality Control</u>
1	No Further Degradation	o all parameters	o maintain status quo.
2	Aesthetic Improvement	o total phosphorus, suspended solids, oils, grease	o mitigation of local problems. o improve smell, colour. o reduce visible solids, debris, etc.
3	Non-Body Contact Recreation Urban Warm Water Fishery	o faecal coliforms o dissolved oxygen, suspended solids, temperature, pH	o meet MOE guidelines for swimming part of the time. o ensure non-toxic conditions
4	Partial Body-Contact in all River areas, other improvements	o faecal coliforms o dissolved oxygen, suspended solids, temperature, pH	o meet PWQO much of the time
5	Fully Acceptable Water Quality	o all parameters	o meet standards for virtually all conditions (except for severe rainfall events)

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The strategy listed a wide range of remedial and mitigative measures which are to be considered in conjunction with the desired levels of improvement. Some of these measures included:

- o construction of wet ponds in existing urban areas on a watershed wide basis;
- o improvement of on site water quality through redevelopment (in essence, the same quantity of runoff in urban areas would be infiltrated into the ground as occurred prior to development; this would be attained through the construction of infiltration trenches, recharge basins, porous pavement, soakaway pits, etc.);
- o continuation of extension of programs to detect cross-connections between the sanitary and storm water systems;
- o implementation of comprehensive spill control and management programs;
- o rigorous enforcement of erosion and sedimentation control practices as outlined in "Guidelines of Erosion and Sediment Control for Urban Construction Sites";
- o construction of wet ponds to service new developments (presently a majority of the ponds are dry) and implementation of Best Management Practices for these areas;
- o improvement of the physical habitat to promote a better fisheries;
- o promotion of public education programs, i.e., litter control, poop and scoop;
- o elimination of channelization works within new developments in cases where existing fisheries may be endangered;
- o installation of control devices to trap floatable oil films, debris, etc. from all combined sewer overflows and storm sewer outfalls;
- o construction of natural channels (i.e., meandering to low flow channels, creation of pools and riffles, selective use of impermeable materials) for reconstruction of existing watercourses;
- o installation of riparian habitat along river courses;
- o pilot projects to develop a warm-water urban sports fishery; and
- o a comprehensive fisheries and ecosystem-based watershed management plan (including flood control, erosion control; terrestrial wildlife and water fowl).

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Many of these actions can be implemented in various scales across the watershed depending on the level of improvement desired, the resources committed, and the timeframe selected.

Many of the ongoing remedial programs which are presently under way to address degraded water quality in the Don River are listed in the Don Strategy as immediate actions to be undertaken. A listing of these programs follows for the Don. A more complete discussion of each program, applicable to the entire RAP area may be found under the component actions listed with each program.

- 1) Aesthetic Improvements - MTRCA has undertaken a clean-up of the Don River under the Environmental Youth Corps Program. ( Component Action # 5.3.1 )
- 2) Household hazardous waste disposal/collection programs are being developed or operated to provide for the safe disposal of household chemicals such as paint, solvents, used motor oil. ( Component Action # 3.2.1.)
- 3) Water Front Water Quality Improvement Program, a MOE funded program which provides assistance for physical works and studies leading towards immediate benefits to tributaries, waterfront or sewers. ( Component Action # 1.3.1 )
- 4) Under an Agreement with MOE, the MTRCA has initiated a work program for restoration of riparian and in-stream habitats. (Component Action # 5.4.1)
- 5) Public education programs are under way. These programs will better inform the public of the sources of pollution, impacts and actions which residents can undertake towards the clean-up of urban rivers like the Don.
- 6) Enforcement of municipal by-laws for litter and pet waste control. ( Component Action #4.1.2 )
- 7) Routine municipal works such as street sweeping, catch basin cleaning and the treatment of sanitary sewage. (Component Actions #4.1.1, 2.1.4)
- 8) Spill Control Programs and Spill Response Teams. ( Component Action # 3.1.2 )

### Potential Program Improvements

Many of the improvement programs identified under the component actions described in the previous sections for the Humber River would also contribute towards the remediation of the Don River. An important objective of RAP is the development of a consistent and unified approach, and the application of abatement programs across all municipal and provincial jurisdictions. It is anticipated that certain improvements will have to be undertaken to

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existing programs to facilitate improvements to Don River water quality. The foremost of these is conversion of the strategy into an implementable plan. Details of this improvement are provided under improvement A below. A brief description of other potential improvements, which are applicable to each of the basin plans is also provided under improvements B-D. The reader is referred to Component Action #4.2.1 (Humber River Plan) for the costs associated with these latter improvement options (provided on a RAP-wide basis).

### **A. Prepare Don River Water Quality Management Plan**

After public and technical consultation leading to decisions on option selection for the RAP, the recommendations identified in the "Strategy for Improvement Of Don River Water Quality" will have to be finalized in a formal management plan with resource commitments and schedules.

It is anticipated that many of the RAP remedial and mitigative watershed measures will be applicable for all river basins. Prioritization of projects under the RAP will provide the direction needed for the balanced allocation of resources to ensure progress within each watershed. The allocation and scheduling of resources to the Don River will ultimately consider requirements for the entire RAP area and will reflect consultation with Public and Technical Advisory Committees.

The Don Strategy outlines all of the remedial and mitigating measures necessary to achieve the maximum level of water quality improvement. These measures were subsequently divided into three phases of implementation.

IMMEDIATE 1989- 1990

PHASE 1 ( 5 - 10 year time frame )

PHASE 2 ( 10 - 50 year time frame )

The first two phases of the Strategy detail options which are readily implementable and are known to be cost effective. Measures which are necessary to achieve significant improvements in water quality over a longer time frame are presented in the third phase. These options are recognized as being both more expensive and less readily implemented.

Preliminary cost estimates for the Strategy were developed to assist the public, area municipalities and provincial agencies in evaluating proposed clean-up measures. Included in the strategy are costs for the continuation of existing relevant programs, as well as costs for the proposed new controls. Cost estimates provided below, assume that some of the proposed works will be undertaken as deteriorating infrastructure is replaced or as new works are constructed for new and future redevelopment. Costs for improved controls on new development are not included as it is assumed that these will be borne by the proponent.

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Improvement costs are shown as annual expenditures and are expressed as present value (1989) total costs. It was assumed that the greatest portion of expenditures will be required during the Immediate term, Phase 1 and initial stage of Phase 2.

### SUMMARY OF COST ESTIMATES FOR DIFFERENT LEVELS OF PROTECTION

<u>Level of Protection</u>	<u>Proposed Programs Annual Cost (\$ Million/yr.)</u>	<u>Proposed Programs 1989 Dollars Total Cost (10-20 Years) (\$ Million)</u>
1. No further degradation	4-5	65-80
2. Limited Aesthetic Water Quality & Fishery Improvements	12-15	200-250
3. Substantial WQ and Aesthetic Improvement	17-27	300-450
4. Body contact recreation most times throughout river; and other improvements	28-36	450-600
5. Meet Provincial Water Quality Objectives and Guidelines	45-56	750-900

The cost for cleaning up the Don could range between \$30 and \$60 million per year if the highest level of improvement is pursued. This effort would be required over a 10 to 20 year period. Total costs could exceed \$1 Billion.

#### **B. Resolve Issues Of Ownership, Proponent, and Environmental Assessments for Retrofitted Remedial Works.**

It has been established in watershed studies for the Humber, Rouge and Don Rivers that the control of stormwater and CSO from new and existing areas will be necessary if the restoration of these rivers and the lakefront are to be achieved. In situations of existing development there is no developer or proponent to accept the responsibility for the

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execution of retrofit controls. Responsibility for funding, implementation, and maintenance must therefore be borne by one or more municipal or provincial agencies.

The implications and considerations with respect to the control of stormwater and CSO are discussed more extensively under Program Improvements for the Humber River. Additional information on CSO control is provided under Component Action #2.2.1. Further discussion of stormwater controls are provided under the component actions listed under Remedial Action # 4.3.

### **C. Institute an Implementation Committee**

At this time there is no timetable for initiating implementation of the recommendations from the Strategy for Improvement of Don River Water Quality. Some of the measures identified for immediate action are underway. There is a need for to coordinate these initiatives. Improvement C under the Humber Plan (#4.2.1) and the Rouge Plan (#4.2.3) each provide a discussion of possible implementation committee alternatives. The critical aspect of any implementation committee are that:

- o the committee must operate within the framework of the RAP to ensure that priorities and resource allocations are consistent with the overall plan.
- o the committee should be chaired by an agency responsible for implementation rather than simply funding.
- o the must be involvement or opportunities for input by public groups.

### **D. Need For Staff and Resources**

Additional staff and resources will required by municipal and provincial agencies to follow through on the delivery of remedial actions for each of the river basins in the Toronto area. In most cases staff and resource needs have been identified for the specific component actions listed throughout this document. There is a need however for a staff resource to shepherd efforts on a watershed basis. Costs and further discussion of this improvement is provided under Improvement D for the Humber River Plan (# 4.2.1).

### Potential Program Benefits

The Don River Strategy presents five improvement options for the Don as staged management strategies which will restore a range of beneficial uses, including swimming, a fishery, reductions in toxic loadings to Lake Ontario and enhanced outdoor recreation opportunities.

Outside of a cleaner Don River and the restoration of water uses for the Don River, the Strategy ultimately could lead towards reductions in beach closures along the waterfront,

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protection of drinking water supplies, an enhanced fishery and a reduction in toxic loadings to Lake Ontario.

The Don River Water Quality Improvement Strategy is the first large scale provincial effort at restoring a severely degraded urban water course. Abatement measures shown to be effective for the Don, should be transferable to other degraded urban water courses, as part of either a Greater Toronto or Province wide urban watershed improvement program.

### Dependent Projects

The majority of Component Actions documented in this report would contribute to remediation of the Don River. The overall selection and prioritization of actions will have a similar impact on each of the watersheds. Certain of the Component Actions are of more importance in the Don River basin than in some of the other basins. Component Actions with a greater significance to the Humber are listed below.

- Main STP Expansion (CSO control)
- North Toronto STP
- CSO control
- Stormwater Program

The potential improvements to the Don River Strategy, cited in this document, are not dependent on any other Component Action except in terms of competition for available resources.

The public and government agencies need to establish within appropriate time frames, water quality goals and management options for the Don, as part of the RAP option selection process. This must be done within the context of actions that are required for the Humber and Rouge Rivers, Mimico, Etobicoke and Highland Creeks and for the waterfront. Water quality improvements for the Don must be shown to be complementary and to be cognizant of longer/broader based water quality management objectives.

Major investments of staff resources and capital funds are required by the municipalities, Metro Toronto, MTRCA and provincial agencies if the programs ( actions ) identified for the clean-up of the Don are to be successful. Substantial capital investments will be required for the up-grading of existing sewer systems and the construction of expanded sewage treatment plants.

### Monitoring Requirements

The Strategy has not been endorsed by the public, municipalities and provincial agencies and so there is no immediate basis for enhanced monitoring. In the interim, existing monitoring studies ( Provincial Water Quality Network and programs by Great Lakes Section (MOE) )

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will continue. Once improvements such as storm water quality ponds, CSO tanks etc. are constructed there will be a requirement for performance monitoring. These studies are normally a requirement of the Certificate of Approval granted for these works by Environment Ontario. Findings from demonstration projects for the Humber River will be applied to the Don clean-up.

The overall monitoring strategy to be developed under RAP will provide the necessary information to gauge overall progress of all remedial measures.

### Reporting

See Component Action # 4.2.1.

### Implementation

The Don River Strategy is presently being reviewed by the public and government agencies. No dead line has been established for the delivery of comments on the acceptability of the recommended controls. The selection of options for the Don River will be accomplished as part of the overall RAP option selection process.

Some of the Strategy's recommendations (immediate actions) are being adopted. Many of these actions are discussed under the specific component actions presented in this paper. A brief summary of the activities of different agencies, as they relate specifically to the Don River are provided below.

### **Metropolitan Toronto Works Department**

Metro Works is presently reviewing the Don River Strategy in conjunction with staff recommendations. A report outlining a specific and comprehensive action plan based on the Don and Humber TAWMS reports and the Metro Toronto Remedial Action Plan will be prepared. In addition, Metro Works is undertaking a number of supporting studies and actions for the Don:

- 1) A study of the Don, Massey Creek and Coxwell sewer systems drainage area to assess trunk sewer capacity to provide for future growth, reduced CSO and to assess the feasibility and cost of conveying North Toronto Treatment Plant flows to the Main Treatment Plant.
- 2) Physical audit of the 60 year old North Toronto sewage treatment plant to determine the capability to remain in service.
- 3) Additional monitoring of storm sewer outfalls during dry weather conditions.

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4) Comprehensive assessments of the Don Trunk Sewer System and the Main Treatment Plant with respect to impact of infiltration/ ability to treat CSO's and handle variable flow regimes.

5) Hiring of additional staff to develop and establish best management practices at industrial sites for the control of run-off.

### **Metropolitan Toronto and Region Conservation Authority**

Staff at the Authority presented findings and implications of the Don River Strategy to the Authority's Board in the fall of 1989. This presentation was followed by briefings to staff and senior management. The Authority is presently examining options for delivering the remedial and mitigative measures identified for immediate implementation. In 1989 the Authority led a program, funded by Environment Ontario, aimed at aesthetic improvement of the Don.

### **Royal Commission on the Future of the Toronto Waterfront and the Kanter Commission**

Last summer the Crombie Commission's released its Interim Report. This report contained several recommendations relevant to TAWMS and to implementation of the Don River Strategy. For example, the Commission identified a need for a strong intergovernmental, regional framework for planning that includes strong community involvement; a Green Strategy to preserve the river valley systems; the initiation of remedial actions, while management studies are being reviewed or completed; the requirement for new development and redevelopment to use up-to-date abatement technology.

The mandate of the Royal Commission has been expanded and has been supplemented by the Kanter Commission which is developing a Greenlands Strategy for the watersheds in the Greater Toronto Area. Kanter is to report by June of 1990. The Royal Commission is conducting an environmental audit of the portlands, including the Main sewage treatment plant. Public hearing on a number of issues, including the Audit and the RAP are scheduled for the Spring. A second Annual Report will be released in the summer.

### **City of Toronto**

The City of Toronto is actively investigating avenues for cleaning up the Don River. An Interim Cleanup Task Force is preparing a plan for the City of Toronto which will address cleanup on two fronts: within the City of Toronto, and within the larger context of the watershed.

### **Environment Ontario**

Ministry staff have been actively pursuing avenues for expediting the implementation of the immediate actions as well as the resolution of outstanding policy issues.

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Recent initiatives in support of the Don River Strategy include efforts to secure funding for the initiation of demonstration stormwater projects; the finalization of Interim Storm water Quality Guidelines; modifications to the WWQIP to encourage programs which will lead towards more direct water quality improvements; initiation of research on storm water quality ponds and best management practices; joint discussions with MNR staff on the need for a Provincial Policy for Urban Drainage Management.

### Potential Delays

Implementation of improvement actions for the Don River may be delayed by the outstanding issues surrounding CSO, STP and stormwater. Efforts are under way on the resolution of these issues. For example, guidelines and/or policies are required for the control of storm water. Metro works is undertaking studies of the 60 year old North Toronto sewage treatment plant to determine it's capability to remain in service or alternatively the feasibility of conveying the sewage flows to the Main Treatment plant. Problems are also anticipated with respect to the provision or availability of capital for CSO, STP and stormwater and requirements for Class Environmental Assessments.

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### Summary Information For Implementation

Component Action:	Strategy For Improvement Don River Water Quality
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	almost all component actions
Implementation Responsibility:	Municipalities, MTRCA, province
Funding Responsibility:	Municipalities and province
Additional Cost Range:	dependent upon level of improvement selected Level 1 : \$ 4-5 mill/yr Level 2 : \$ 12-15 mill/yr Level 3 : \$ 17-27 mill/yr Level 4 : \$ 28-36 mill/yr Level 5 : \$ 45-56 mill/yr
Monitoring Requirements:	to be determined
Reporting Requirements:	to be determined
Timeframe:	immediate to 50 years
Potential for Delay:	high for some options
Potential Reasons for Delay:	Resources, Scheduling, Priorities

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### Reference Documents

Paul Theil Associates and Beak Consultants Limited 1989 Strategy For Improvement of Don River Water Quality - Summary Report prepared for TAWMS Steering Committee

Five supporting Documents, on file with Environment Ontario contain the remainder of the Don River Study Findings:

Supporting Document 1: Contains a description of the sources of contaminants to the river and the calibration of the spread sheet loading model.

Supporting Document 2: Describes an evaluation of the present fishery of the Don River, the impact of aquatic toxicity and responses to water quality improvements.

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Supporting Document 3: Describes a methodology for evaluating the response of water quality spills remediation and the cost and effectiveness of other control measures.

Supporting Document 4: Contains a summary of existing water quality characteristics, identifies sources of pollution and relates these sources to stakeholder concerns and provincial water quality objectives.

Supporting Document 5: Detailed Analysis of Existing Water Quality Data

There are three technical reports related to the Don River under the TAWMS Program.

### COMPONENT ACTION #4.2.3:      Continue Development and Implementation of the Rouge River Watershed Management Strategy

The Rouge River watershed includes the north-eastern sector of Metropolitan Toronto (City of Scarborough), most of the south-eastern quadrant of the Regional Municipality of York (towns of Markham, Whitchurch-Stouffville and Richmond Hill), and a small portion in the west of the Regional Municipality of Durham (Town of Pickering), comprising altogether 320 square kilometres. Historically, development of the watershed has brought about major changes in the land use characteristics of the basin and the physical and hydraulic characteristics of the watercourse, as a result of agriculture, urban development, forestry harvesting and flood control. Land uses tended to be superimposed upon each other, in the same fashion as urban development is now superimposed on agricultural lands. Urbanization tends to be greatest adjacent to the lake and least in the headwaters, such that some headwater streams still remain relatively undisturbed by human settlement.

The pressures of urban and population growth on the Rouge watershed have not as yet been as intense as on the watersheds of, for example, the Don River. Nonetheless, with the continuing rapid growth of the Region's population, growth pressures within the watershed will continue to intensify. Planning studies have established and evaluated existing land use and committed land use within the watershed and provided future land use scenarios. These planning studies estimated urbanization would amount to approximately 34% and 41%, respectively, for medium and high growth scenarios, based on a planning horizon of 30 years.

Water quality in the Rouge River is currently relatively good compared to the other watersheds within the RAP area. The watershed is at a critical point however, where watershed management measures have to be taken to avoid further degradation. Conflicting interests presently compete for the future of the Rouge watershed. Controversy over future uses of the river are fuelled by such issues as road construction, landfill requirements and proposals for the creation of National or Provincial Parks.

In 1985 MTRCA initiated the Rouge River Urban Drainage Study at the request of the City of Scarborough and the Save the Rouge River Valley group. The objectives of this study

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were to evaluate management practices relating to urban drainage, and to develop and evaluate new practices where warranted. The study was conducted on the basis of affected and interested parties and agencies taking a consensus-building stance towards the management of the Rouge River. This approach built on the experience of TAWMS which had identified the need to integrate and clarify the roles of various municipal and provincial agencies. The process further recognized the need for involvement of public groups from the early stages in watershed plan development. The approach was consistent with RAP philosophy, recognizing that natural and man-made aspects of the river valley are interrelated, and that water quality (and watershed) planning is not the responsibility of a single agency.

The Rouge River Urban Drainage Study used state of the art modelling and assessment techniques and employed experts from the fields of hydrology, erosion process, water quality and aquatic ecology to complete a series of technical reports documenting existing basin characteristics, predicting future changes and examining the effectiveness of current storm water practices.

At the completion of the study, MTRCA assembled a steering committee of agency staff and public interest group representatives to assist the Authority in:

- i. Reviewing and qualifying conclusion of the Rouge River Urban Development Study
- ii. Preparing a " Vision" statement for the watershed
- iii. Establishing management goals for future use
- iv. Developing a comprehensive watershed management strategy

The result was the The Rouge River Watershed Management Strategy. The contents of the strategy are described below, together with other ongoing programs which effect the Rouge River.

### Existing Programs

The Rouge River Watershed Management Strategy contains immediate, medium and long term actions for the improvement and protection of water resources and valley lands. Operational criteria are provided in the Strategy to direct the required actions for the management of the Rouge River. These actions are further categorized according to lead agency responsible for implementation. Participating and supporting agencies and interest groups roles, as well as, time frames for initiation of the Strategy's recommended actions are provided.

A listing of the actions proposed and the agency responsible follows.

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### ROUGE RIVER BASIN MANAGEMENT STRATEGY LEAD AGENCY - IMPLEMENTATION ACTIONS

#### MTRCA

- Expand MTRCA and municipal enforcement program (initiate within 1 year).
- Coordinate pilot study of effectiveness of urban best management practices for water quality improvement (initiate within 1 year).
- Extend floodline mapping to the 130 ha drainage limit for all Level 1 and 2 streams (initiate within 1 year).
- Expand MTRCA and municipal enforcement programs to ensure compliance with development control.
- Delineate Master Drainage Plan areas on a 1:10000 base map (initiate within 1 year).
- Prepare generic Terms of Reference for Master Drainage Plan studies (initiate within 1 year).
- Establish a hydrologic model maintenance program (initiate within 1 year).
- Accelerate acquisition of hazard lands (initiate within 1 year).
- Develop a program of remedial works and acquisition for the flood susceptible section of Unionville (initiate within 1 year).
- Develop an enhanced data gathering Network Plan for the Rouge watershed incorporating precipitation and stream gauging (initiate within 1 year).
- Utilize the Rouge Hydrologic Model to maintain an up-to-date representative model of development on the Rouge River watershed (initiate in 1990).
- Establish a public education program to increase public awareness of floodplain management and flood and erosion control objectives.
- Define Habitat Suitability Index (HSI) (initiate within 1 year).
- Review policies regarding permitted uses in the floodplain to minimize impacts on Riparian Habitat Zone.
- Establish the Riparian Habitat Management Program (initiate within 1 year).

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- Rehabilitate fish habitat for target fish communities (initiate in 1990).
- Establish public education/awareness program for landowners to control soil erosion (initiate within 1 year).
- Establish public education and awareness program to outline the importance of healthy riparian habitats (within 1 year).
- Establish a private lands stewardship program to rehabilitate terrestrial habitats on rural and urbanizing lands (initiate in 1990).

## MOE

- Undertake and sponsor additional environmental studies including groundwater quality and quantity and contaminant concentrations in the watershed.
- Extend existing provincial programs under a cooperative "Rouge River Farm Remedial Program" to control bacterial inputs (initiate within 1 year).
- Monitor contaminant levels in fish tissue (initiate in 1990).

## MNR

- Prepare fisheries management plan for Rouge River (initiate within 1 year).
- Monitor incidence of disease, parasite and viruses in resident fish.
- Establish a resource monitoring program on selected significant terrestrial habitats to determine impacts from hydrological changes (initiate within 1 year).

## OMAF

- Extend existing provincial programs under a cooperative "Rouge River Farm Remedial Program" to control bacterial inputs (initiate within 1 year).

## MUNICIPALITIES

- Accelerate existing programs of designating important floral and faunal features as environmental protection areas through the municipal planning process.

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- Eliminate and/or control dry weather phosphorus sources such as illegal waste discharges to storm sewers and faulty septic systems.
- Expand MTRCA and municipal enforcement programs (initiate within 1 year).
- Ensure that spill retention ponds are incorporated in new industrial commercial developments (initiate within 1 year).
- Maintain and/or extend municipal maintained enforcement programs (initiate within 1 year).
- Maintain and/or extend municipal spill action control programs (initiate within 1 year).
- Modify existing road maintenance and Parks and Recreation practices to minimize impacts on water quality (initiate within 1 year).
- Establish a public education and awareness program (initiate within 1 year).
- Ensure appropriate 'Open Space - Hazard Land' designations and policy statement are contained in local and regional municipal official plans (initiate within 1 year).
- Delineate Master Drainage Plan areas on a 1:10000 base map.

The actions proposed in the Strategy will build upon a variety of programs are underway to enhance and protect the river's water quality and valley lands in all watersheds within the RAP area. These include:

- 1) Water quality monitoring by the Great Lakes Section and Watershed Management Section of Environment Ontario's Water Resources Branch.
- 2) Agriculture Best Management Plans are to be developed for the application of fertilizers, herbicides and pesticides and the handling of livestock wastes. MTRCA staff will continue to maintain active contacts with the valley's agricultural community (see Component Actions # 3.3.1 and 4.1.5).
- 3) Aesthetic improvements under the Environmental Youth Corps Program included a clean-up of Rouge Valley lands (see Component Action # 5.3.1).
- 4) Public education efforts are being increased by the Save Rouge River Valley Association, MTRCA and municipalities of the watershed. These programs serve to better inform the public of sources of pollution, impacts and improvements which residents and interested parties can undertake to clean-up the Rouge.

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- 5) Cooperative sediment and erosion control programs are underway between the MTRCA and municipalities (see Component Actions # 4.1.3, 4.1.4, and 5.4.1).
- 6) Spill control programs (see Component Action # 3.1.2).
- 7) Regular municipal works such as street sweeping and catch basin cleaning (see Component Action # 4.1.1 and 4.1.2).
- 8) Initiation of stormwater quality management programs for new developing urban areas.
- 9) Inventories of outfalls (sewers) discharging into the river (see Component Action # 2.2.2 and 3.1.1).

The Rouge River Fisheries Management Plan is being undertaken in 1990-91 at a cost of \$100,000. This is a cooperative effort, utilizing funding from involving MNR, MTRCA, Metro, Scarborough, Markham, Richmond Hill, and Whitchurch-Stouffville. The Save the Rouge Valley group is involved on a consultative basis.

### Potential Program Improvements

The Rouge Strategy is the latest of a series of efforts aimed at the major river basins in the Toronto RAP area and as such it is "state-of-the-art" in terms of the current approach to comprehensive basin planning. Some improvements are possible however, in order to ensure successful implementation.

#### **A. Determine Costs and Seek Agency Commitment of Necessary Resources**

Costs estimates have not been prepared for many of the actions called for in the Rouge River Strategy. Many of the recommendations in the Strategy are targeted for the prevention of future watershed and water quality problems. It is therefore reasonable to assume that costs and resource requirements will be considerably less than those identified for the Don and Humber Rivers. Proponents of future development will be required to provide for the control and treatment of stormwater.

Many of the programs proposed however, involve action in the short term or increased enforcement. The resources required for these measures will not come from new development and it will be the responsibility of the municipal and provincial agencies to provide the necessary funds. While Strategy development indicated to each agency that by endorsing the Strategy they were agreeing to the recommended actions, until cost estimates of the different measures are provided, it will be difficult for any agency to make more than a "commitment in principle". Implementation has begun for some of the actions, but comprehensive action is not likely until resource commitments are made by all agencies. To

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some extent, the RAP will be of assistance in this regard as cost estimates for many of the proposed programs are provided under the various component actions. The costs provided are not specific to the Rouge alone however, but are the total costs for the entire RAP area.

Municipalities, provincial ministries and interested parties need to investigate the financial and resource implications of the actions they are responsible for in the Rouge River Strategy as having either a lead or supporting role. Each agency should be responsible for costing the required actions, in consultation with the Rouge Steering Committee. Once costs have been established, the necessary submissions should be made to seek, agency approvals for program implementation.

Within the context of this options paper, no costs has been attributed to establishing this improvement.

### **B. Form a Rouge River Implementation Committee**

In keeping with the cooperative spirit in which the Rouge River Strategy was formulated it is expected that an implementation committee will established under the direction of MTRCA to oversee and coordinate the delivery of the recommended actions. The Committee should build upon the efforts to date and should include members from agencies, municipalities and public groups. In matters relating source control programs, under municipal control, a close working liaison should be formed with the Metro-chaired Water Quality Improvement Coordinating Committee (WQICC). This committee, which acts as a subcommittee of the RAP's Technical Advisory Committee is discussed under Improvement C of the Humber River Plan (Component Action 4.2.1). The Rouge River Implementation Committee should ensure that actions taken to and the resources committed are consistant with the goals and priorities established through the RAP process.

No costs have been associated with the establishment of this committee.

### **C. Additional Staff Resources**

Improvement D, listed under Component Action 4.2.1 (Humber River Plan) suggested the requirement for five permanent staff to actively shepherd implementation of remedial actions on individual river basins, within the RAP area. It is anticipated that one of these staff would be assigned to the Rouge. The costs for this option and a more detailed description are provided under Component Action # 4.2.1.

### Potential Program Benefits

The development of the Strategy for the Rouge River provided a common forum and facilitated the sharing of technical information amongst the various agencies involved in the management of the watershed. A major benefit of the Strategy is the ground work it

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established for decision making. Managers of the watershed and interested parties have at their disposal a comprehensive data base, reliable predictive models, identified management techniques which are deemed sufficient for the coordinated planning, implementation and monitoring of the watershed. The Rouge Strategy represents an application of the Greenspace Plan (Component Action # 6.4.1) concept to a single watershed. The process followed and the issues considered provide a prototype for the development of a comprehensive resource management strategy process which should be applied to all RAP watersheds. This is discussed further under Component Action 6.3.1, Improvement B.

The Rouge strategy seeks to provide prevent future degradation, protect existing resources and improve existing conditions. In addition to a cleaner Rouge River, the Strategy also provides for the enhancement and protection of water uses such as swimming, fishing, reductions in toxic loadings to Lake Ontario and improvements in beach openings along the waterfront.

### Dependent Projects

Many of the Component Actions documented in this report would contribute to remediation of the Rouge River. The overall selection and prioritization of actions will have a similar impact on each of the watersheds. Certain of the Component Actions are of are more important in the Rouge basin than in some of the other basins. Component Actions with a greater significance to the Rouge are listed below.

- Development and Agricultural Controls (large non-urban upper watershed)
- Stormwater Program
- Stream and Habitat Improvement

The potential improvements to the Rouge River plan, cited in this document, are not dependent on any other Component Action except in terms of competition for available resources.

### Monitoring Requirements

The Rouge River Strategy identifies deficiencies in the monitoring of organic compounds ( pesticides, toxins, herbicides etc.), leachate from waste management sites, sediment contaminants, aquatic toxicity and ground water resources. Lead agencies for this monitoring and time schedules for implementation have been identified. The overall monitoring strategy for the Rouge will be interfaced with the broader monitoring strategy for the entire RAP.

### Reporting

At this time no requirement for reporting has been identified. It is anticipated that this need will be established during both strategy review and consultation with RAP. This approach ensures that reporting structure and procedures will be common and of use to all parties.

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### Implementation

The Rouge River Strategy is scheduled to be released to the public and agencies in 1990. No dead line has been established for review or endorsement. Implementation of the strategy's recommendations has been identified into immediate and future actions. Responsible agencies are exploring the availability and ability of existing programs to deliver.

### Potential Delays

Potential delays for initiation of the protective and enhancement directives for the Rouge River include the time frame necessary for public and agency review and formal endorsement of the Strategy. Limited or conflicting demands for resources and a lack of coordinated efforts on the part of various agencies responsible for implementation may also result in delays.

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### **Summary Information For Implementation**

Component Action:	Rouge River Management Strategy
Priority Of Remedial Intent:	
Priority Of Component Action:	
Related Programs/Projects:	Almost all components identified for the Don and Humber Rivers
Implementation Responsibility:	MTRCA, provincial agencies, municipalities, interest groups
Funding Responsibility:	MTRCA, Province, Municipalities
Additional Costs:	Not yet defined
Monitoring Requirements:	RAP Monitoring, MOE and MNR
Time Frame:	Ongoing
Potential For Delay:	Moderate
Potential Reasons For Delay	Dependent on time required for Strategy review and endorsement and availability of resources.

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### References

#### Rouge River Urban Drainage Study

##### PHASE I TECHNICAL REPORTS

- o Volume 1: Executive Summary
- o Volume 2: Subwatershed Hydrologic Modelling
- o Volume 3: Subwatershed Water Quality Modelling
- o Volume 4: Subwatershed Runoff Control Study
- o Volume 5: Subwatershed Erosion Control Study
- o Volume 6: Watershed Water Quality Assessment
- o Volume 7: Watershed Environmental Studies

##### PHASE II TECHNICAL REPORTS

- o Volume 1: Completion of Subwatershed Studies
- o Volume 2: Watershed Wide Studies
- o Volume 3: Flood Control Study- Upper Rouge River
- o Volume 4: Water Quality Study Phase II
- o Volume 5: Environmental Studies Phase II

#### Rouge River Watershed Management Study

- o A Comprehensive Basin Management Strategy For The Rouge River Watershed -Draft January 1990
- o Appendices of A Comprehensive Basin Management Strategy For The Rouge River - draft January 1990

### REMEDIAL ACTION #4.3:

Continue to Develop and Implement Policies and Guidelines for Stormwater and Combined Sewer Overflow Quality Control

Virtually all studies which have been conducted in recent years on river basins, river mouths and lakefront beach locations have come to a similar conclusion. A major cause of water quality degradation under present day conditions is discharge of stormwater runoff.

Urban stormwater runoff (including Combined Sewer Overflows (CSO's)) is a significant source of suspended solids, bacteria, nutrients, organic matter, oil and grease, chlorides, heavy metals and toxics to the water courses and the waterfront. These pollutants originate from vehicular and industrial emissions and leakages, atmospheric fallout, street litter, animal

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droppings and road de-icing materials. When it rains, these contaminants are washed into the sewer systems and then into the rivers or the lake.

It is generally recognized that without stormwater and CSO quality control, the ultimate attainment of Provincial Water Quality Objectives (PWQO) for the above-listed pollutants is impossible. It is clear that stormwater and CSO controls can produce improvements in water course and waterfront water quality, and it seems likely that benefits can be anticipated in terms of protecting and enhancing recreational areas, benthic and fish communities and habitat. Quantification of these benefits is not possible beyond load reduction calculations because of the many factors other than water quality that may effect the fishery.

Despite the uncertainties regarding benefit quantification, many jurisdictions are moving towards water quality control of stormwater and CSO. Numerous questions have been raised by scientists, municipalities and the public which will need to be answered. Some of the most important of these include:

- potential shallow groundwater contamination
- collection of concentrated contaminated sediments requiring disposal
- potential water quality degradation (temperature, dissolved contaminants)
- creation of numerous sites for potential bioaccumulation by birds and animals
- public health and safety
- costs

The majority of these questions and concerns arise from the fact that stormwater and CSO quality control, whether through the use of storage and treatment facilities, infiltration devices or imperviousness controls, is effectively an end-of-pipe control rather than a source control. The pathway of most contaminants is through atmospheric deposition and efforts to control air and vehicular emissions may ultimately reduce the need for stormwater quality control. There are limitations in this regard, however, because:

- local efforts alone will be insufficient to significantly reduce atmospheric deposition
- CSO has a sanitary wastewater component that is expensive to remove
- a lengthy period of time may be required before contaminants already in the urban drainage areas are bound up or removed.

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The various Component Actions discussed in the following sections reflect the overall uncertainty currently surrounding stormwater quality control. The question is not however "Is it needed?", but rather what is the best way to proceed in order to ensure that we do not create unforeseen ecosystem impacts or commit needed resources to a inefficient option.

### COMPONENT ACTION #4.3.1:

#### Stormwater Program (Policy, Guideline, Manual Development)

Stormwater quantity control has been practised extensively in the Metro Toronto RAP area. Stormwater quality control is a relatively new concept in comparison. While some measures used in quantity control (eg. maximizing infiltration) also have benefits in quality control, in most cases the basis for design and the measures employed are different. There is therefore a need for a coherent set of policies, guidelines, and manuals addressing quality control.

### **Policy**

The Province of Ontario has conducted or coordinated considerable research on pollution from both urban and non-urban sources since the signing of the Canada-Ontario Agreement on Great Lakes Water Quality (COA) in 1971 and the Canada-United States Agreement on Water Quality in 1972. The Urban Drainage Subcommittee was formed to coordinate research into urban drainage management for the COA Technical Committee. At the request of the Urban Drainage Subcommittee the Urban Drainage Policy Committee was formed in 1977 to consolidate all the research and development findings and propose comprehensive model policies for urban drainage management that would lead to the alleviation of pollution as well as the resolution of flooding problems in urban areas. The Urban Drainage Subcommittee commissioned the preparation of a "Manual of Practice for Urban Drainage" (COA, 1980). The manual formed the technical background for the Policy Committee in preparing a report entitled "Proposed Model Policies for Urban Drainage Management" (COA, 1980).

The Policy Committee's recommended management approach was described in five policy proposals:

- 1) Municipalities, in coordination with the Conservation Authorities, should develop master drainage plans for all watersheds within their boundaries. The purpose of this policy is to foster master drainage planning in rapidly developing municipalities so that storm water drainage systems can be developed in a manner compatible with watershed needs, to identify existing water quality and flooding problems, and to avoid future problems.
- 2) Municipalities with sewage collection and treatment systems should formulate and implement a comprehensive pollution control strategy that considers both wet and dry weather pollution sources. In the initial stage of the formulation, an in-system review

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of previously unidentified wet weather sources, volumes and magnitudes of pollution should be carried out. Consideration of receiving water objectives, and the cost and effectiveness of wet weather versus dry weather controls would lead to a final comprehensive strategy. The end result would be more cost-effective investment in municipal pollution control.

- 3) Drainage systems for all new development should be designed using the major-minor concept, which recognizes the drainage system's dual role of providing conveyance during minor (high frequency) runoff events and minimizing property damage and protecting life during major (rare) runoff events. Expenditures for sewer construction are expected to be reduced since the minor system would be designed to avoid excessive costs incurred by the use of overly conservative design techniques or excessively rare design runoff events, while the major system would be designed to provide protection against damage from runoff events that exceed the capacity of the minor system. The overall drainage system would also provide a higher level of protection since a major system of flow routes on roadways and drainage easements would be provided for rare events, and an awareness that some level of inconvenience would be experienced from time to time would be introduced.
- 4) Proponents of new urban developments should indicate the effects of the development on the watershed and carry out mitigative measures as required. Hydrologic changes and pollution effects on the receiving watercourse are considered to be the important effects in this case.
- 5) Proponents of new urban developments should plan for and carry out an erosion and sediment control program in the planning and construction stages of development, and follow this with an adequate maintenance program. Construction-generated sediment pollution is considered a severe enough problem to justify controls on an across-the-board basis.

It was foreseen that acceptance of this approach would ensure that drainage problems would be minimized, expenditure would be avoided, safety would be improved, the environment would be enhanced, there would be better coordination between the various government agencies involved and urban drainage administrative and approval procedures would be simplified.

### **Guidelines**

Guidelines are intended for use until more specific policies on stormwater are formulated.

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### **Manuals**

Manuals have been prepared which consolidate information on urban drainage problems and solutions identified by research in Ontario and elsewhere.

### Existing Programs

### **Policy**

Implementation of the Urban Drainage Management Program was initiated through the Inter-Ministerial Urban Drainage Policy Implementation Committee (UDPIC). The program of implementation has the following key features:

- Master drainage plans and stormwater management plans are considered the most appropriate means for incorporating watershed constraints and implementing drainage control requirements in newly developing areas. These urban drainage plans are to be integrated with the normal land development process.
- The need for the Province to provide continued technical support and training in technical aspects is outlined.
- Technical guidelines which provide examples of the best current practices in drainage design and erosion and sediment control are to be provided.
- Methods of streamlining and clarifying the review and approval process are to be provided.
- Flexibility in application of the program is expected because the emphasis on local interests is ensured by transferring much of the planning responsibilities to municipalities, and by the inherent flexibility in the technical guidelines which present optional ways of achieving objectives.
- The program will ensure that planning of drainage systems will be coordinated, design and construction will be cost effective and the approval process will speed up. The resulting effects will be a higher level of protection against flooding and pollution and orderly development.

The Pollution Control Planning (PCP) process is intended to provide the framework necessary to formulate management decisions regarding water pollution control expenditures for existing developed areas. The PCP structures the necessary technical, economic and public opinion data for the benefit of the decision makers. The public participation component of the PCP gauges the public perception of water management problems and enables the concerns of the public to be incorporated into action plans. The objective of the PCP is to comprehensively

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document the future course of pollution control in a community. Once this has been accomplished both the municipality and the province will be better able to estimate funding requirements.

Pollution Control Planning will be carried out on an "as needed" basis separately from urban drainage planning such as Master Drainage and Stormwater Management plan preparation. The Pollution Control Plan will, however, provide input to the urban drainage planning activities where multi-source water quality problems exist.

### **Guidelines**

Work has been completed on a number of guidelines intended to assist in the implementation of works impacting on water quality.

The purpose of the Urban Drainage Design Guidelines (UDDG) is to assist the development industry, municipalities, Conservation Authorities and other agencies in addressing stormwater drainage designs for new urban development. The main emphasis of the UDDG is on stormwater quantity management; however, brief reference is also made to stormwater quality management.

The purpose of the Guidelines on Erosion and Sediment Control for Urban Construction Sites (GESCUCS) is to provide developers, municipalities and review agencies with a practical method for ensuring that urban construction is carried out in such a manner that a minimum amount of soil is eroded from the site and deposited in adjacent watercourses and/or drainage works. The GESCUCS outline an evaluation method for construction site erosion potential based on soil type, slope and slope length. Also provided is a list of erosion and sediment control measures. Throughout the guidelines the approach is to encourage prevention rather than to effect cure; emphasis is placed on protection of exposed surfaces and the control of runoff. The control measures in the guideline are not exhaustive, it is anticipated that those responsible for implementation will continue to utilize innovative approaches which best address specific situations.

Both the UDDG and the GESCUCS are the result of the cooperative effort of the Ministries of Environment, Natural Resources, Municipal Affairs, Transportation, and Communication, the Association of Conservation Authorities of Ontario, the Municipal Engineers Association and the Ontario Urban Development Institute.

The purpose of the Technical Guidelines for Preparing a Pollution Control Plan (TGPPCP) is to advise consultants, municipalities, and regulatory agencies involved in the process of preparing a Pollution Control Plan (PCP). The guidelines present the background leading to the PCP concept and summarize relevant legislation and policy. The guidelines also present technical aspects of PCP preparation including developing terms of reference, cursory and detailed assessment procedures, and pollution control alternatives.

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Work is being done to prepare guidelines that address the need for stormwater quality management in new developments in Ontario.

The Interim Stormwater Quality Control Guidelines (ISQCG) are being developed jointly by the MOE and MNR to address the need for stormwater quality management in new developments in Ontario. The purpose of these guidelines is to provide guidance to proponents, municipalities, and the staff of MOE and MNR in the information requirements, evaluation and approval of development proposals. These guidelines will be reviewed and updated on an ongoing basis.

A joint MOE/MNR technical committee is working on interim stormwater pond guidelines to supplement the ISQCG's. The purpose of these guidelines is to provide technical guidance to proponents, municipalities, and the staff of MOE and MNR in the planning and design aspects of detention/retention facilities for stormwater pollution control for new developments. These guidelines will be reviewed and updated on an ongoing basis. They are not intended to be a design manual. However, a study has been initiated to assemble the database and to outline the work program for developing a design manual for ponds and other Best Management Practices (BMP's).

A joint MOE/MOH recreational water quality criteria re-evaluation is being undertaken. This joint venture has been approved by both senior management levels and has a three phase approach:

- 1) a review of new microbiological information that has surfaced since the scientific criteria document was prepared in 1984.
- 2) an advisory committee chaired by the Ministry of Health made up largely of Medical Officers of Health will review the support documentation and recommend guidelines to the Chief Medical Officer of Health.
- 3) communication and implementation of the guidelines by the Medical Officers of Health.

### **Manuals**

The Manual of Practice for Urban Drainage (COA, 1980) was intended to lay a foundation for the introduction of policies related to the prevention and abatement of urban drainage problems. Planning and design concepts, analytical and design methodologies, and technological alternatives for prevention and abatement of storm runoff quality and quantity related problems were presented for the information of consultants, planners, developers, and municipal officials.

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### Potential Program Improvements

#### **A. Policy**

Development of a Stormwater Regulation/Policy/Strategy (RPS) will bring control of stormwater quality to newly developing areas and areas with existing separated stormwater and combined sewer overflow systems. The RPS should be developed considering the stormwater RPS's of other provincial and foreign governments that have an environment similar to Ontario's (Quebec, British Columbia, parts of the U.S.A., Great Britain, France, West Germany, and Sweden). It is anticipated the RPS could be developed in 1 to 1.5 years, with existing staff resources. Implementation could take substantially longer, depending on the form of the RPS. At present, no agency has a capability to implement such a program, with existing a staff resources. It is anticipated that the number of additional staff needed would be large, because this would be a completely new responsibility for the selected lead agency.

#### **B. Combined Sewer System and Overflow Improvement Guidelines**

The Combined Sewer System and Overflow Improvement Guidelines (CSSOIG) should be developed to assist municipalities and MOE staff in improving municipalities' present operational plans for their combined sewer systems. These guidelines would assist in the selection of potentially very expensive structural control options. These structural controls may be reduced in size or avoided if the existing wet weather treatment system is properly optimized.

Development of the guidelines would require 1 to 1.5 years and could be accomplished with existing staff resources.

### Potential Program Benefits

#### **Policy**

Uniformity and standardization of stormwater quality control efforts.

#### **Guidelines**

Clearly defined responsibilities and procedures for stormwater quality control.

#### **Manuals**

Transfer of state-of-the-art methods and technology to front-line practitioners.

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### Dependent Projects

None of the component actions are directly dependent upon the development of policies, guidelines and manuals. Progress on implementation of stormwater related controls is likely to be impeded if these are not available however, as there is a wide range of opinion as to the techniques to be used and the proper level of design. The basin plans (# 4.2.1, 2, 3), the pilot pond program (# 4.3.2) and CSO control (# 2.2.3) could be effected by the pace of policy development.

Outside of the RAP process, development in this area depends on the work of:

- 1) the Interim Stormwater Quality Control Guidelines development committee.
- 2) the Interim Stormwater Pollution Control Pond Design Guidelines development committee.
- 3) the Joint MOE/MOH Recreational Water Quality Criteria Re-evaluation committee.

### Monitoring Requirements

The success of the policy, guideline, and manual development initiatives is dependent on the monitoring of developments in the field of stormwater management both in Canada and the rest of the world. There are no specific RAP monitoring requirements, except as applicable on a project specific basis.

### Reporting

The reports, guidelines and manuals generated by the various committees should be distributed to all interested parties as soon as they become available. The annual RAP report should contain information on progress and the availability of these materials.

### Implementation

At present the province's focus and major staff commitment is to source control through the MISA program. The work on stormwater that is proceeding is directed primarily towards control in new developments. There has been limited effort applied to policy development for stormwater from existing development.

### **Policy**

Once developed, implementation requires endorsement of the formalized policy by MOE's Management Committee and Ministerial approval.

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### **Guidelines**

A second draft of the Interim Stormwater Quality Control Guidelines (ISQCG) has been circulated for comment among Ministries, members of the Urban Drainage Policy Committee, municipalities, academia, consultants and some public interest groups. A third and final draft is being prepared.

A committee is drafting the Interim Stormwater Pond Guidelines (ISPG).

Proposals will be solicited from consultants for the joint MOE/ MOH recreational water quality criteria re-evaluation in 1989. It is envisaged that the consultant will submit a final report early in 1990.

### Potential Delays

Policy, guideline and manual promulgation is not usually a rapid process as it requires input from many sources and the required work must be fitted in to the schedules of many people. The speed at which the process moves is often a function of public demand.

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### Summary Information for Implementation

<b>Component Action:</b>	Stormwater Program (Policy, Guidelines, Manuals)
<b>Priority of Remedial Intent:</b>	
<b>Priority of Component Action:</b>	
<b>Related Programs/Projects:</b>	Basin Plans (# 4.2.1, 2, 3) Stormwater Pilot Ponds (#4.3.2) CSO Control (#2.2.1)
<b>Implementation Responsibility:</b>	Province
<b>Funding Responsibility:</b>	Province
<b>Additional Costs Range:</b>	not costed
<b>Monitoring Requirements:</b>	to be determined
<b>Reporting Requirements:</b>	progress in annual RAP report
<b>Time frame:</b>	Ongoing
<b>Potential for Delay:</b>	medium
<b>Potential Reasons for Delay:</b>	complexity of issues, numbers of interests affected

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### Reference Documents

#### **Urban Drainage Design Guidelines,**

Ontario Ministries of Natural Resources, Environment, Municipal Affairs and Transportation & Communications

Association of Conservation Authorities of Ontario

Municipal Engineers Association

Urban Development Institute, April 1987

#### **Guidelines on Erosion and Sediment Control for Urban Construction Sites,**

Ontario Ministries of Natural Resources, Environment, Municipal Affairs and Transportation & Communications

Association of Conservation Authorities of Ontario

Municipal Engineers Association

Urban Development Institute, May 1987

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**Technical Guidelines for Preparing a Pollution Control Plan**  
Ontario Ministry of the Environment, 1987

**Proposed Model Policies for Urban Drainage Management**  
Research Report No. 102  
Urban Drainage Policy Committee  
Canada-Ontario Agreement on Great Lakes Water Quality, 1980

**Manual of Practice for Urban Drainage**  
Research Report No. 104  
Canada-Ontario Agreement on Great Lakes Water Quality, 1980

**Scientific Criteria for Microbiological Standards for Recreational Waters**  
Ontario Ministry of the Environment  
Hazardous Contaminants and Standards Branch  
May, 1984

### COMPONENT ACTION # 4.3.2:

### Construct Pilot Multi-use Stormwater Ponds and Develop Design Criteria

There are questions relating to the ecological effectiveness of stormwater quality control measures in mitigating the impacts of wet weather discharge. Because of these concerns, and the potentially high social and monetary cost of stormwater controls, the approach recommended in the Humber and Don River studies was to implement facilities as demonstration projects. In addition, recommendations were to develop manuals of practice and conduct inventories and prioritization studies, anticipating larger scale implementation of stormwater controls in future.

The main reasons for this phased approach were:

- pond effectiveness has been variable in cases documented in the literature. Pond design criteria is poorly documented.
- ponds will reduce the total contaminant load but act primarily on the contaminants attached to sediment particles which have only a limited effect on fish in the rivers. It is possible that ponds could provide an environment where contaminants attached to particulate could be released in a dissolved and therefore more toxic form.
- ponds may have impacts on other beneficial uses (loss of parkland, safety, impediments to fish movement).
- although much data is available on wet and dry discharges from storm sewers within Metro, comparatively little work has been done with respect to physical site

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feasibility and prioritization of sub-watersheds. Since costs will be high and necessarily spread out over time, prioritization will be required in order to assure effective expenditure of resources.

The first demonstration project recommended by TAWMS was the construction of a stormwater pond on Emery Creek (Humber River basin) to test the effectiveness of this type of control. This site was selected because it is an industrial catchment, has a relatively small drainage area and has a technically feasible location for a pond. The program was to allow evaluation of retention, on-line U-V disinfection, spill control potential, and impact on the riverine fishery.

The recently completed Don River Strategy contained a number of recommendations for immediate actions which relate to the need for demonstration projects and prioritization studies. The pertinent actions are provided below. The study did not address the question of specific locations for demonstration projects.

2. Demonstration projects should be implemented for the following:
  - o natural channel design (to incorporate fish habitats and stream bank vegetation into a new upstream channelization project);
  - o urban fishing in a Don River tributary; and
  - o disinfection or extended storage of a wet pond to achieve swimming objectives.
3. Results of wet pond demonstration projects from other watersheds and monitoring from other studies should be developed into a manual for implementation of wet ponds.
7. All present stormwater management facilities in the Don River watershed should be documented and assessed as to their potential ease of conversion to wet ponds or to extended detention ponds.
8. Priority sites for control of bacterial discharges from existing sources (storm sewers, CSO's) should be established.
9. Existing studies be synthesized into useful criteria for design and approval of wet ponds. Such criteria should incorporate, where feasible, water quality control; water quantity control; aesthetic, social, and landscape amenities; erosion control; internal water quality (eutrophication, faecal coliforms) considerations; fisheries habitat and wildlife habitat. Site specific attributes will require prioritizing these criteria.

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### Existing Programs

No demonstration projects are currently in construction or operation within the RAP watersheds. The Emery Creek facility is at the most advanced stage because substantial work on site feasibility and pond configuration was completed as a sub-project under the TAWMS Humber program. Implementation of this project has been stalled until recently because no agency has been willing to accept proponency. Metro Works has recently agreed to act as proponent, subject to 85% provincial funding. Efforts to gain funding approval for this project will commence in 1990.

Additional demonstration projects have been requested by a few municipalities. Scarborough has requested funding for a study of a Dunkers Flow Balancing System, a form of stormwater control. Scarborough has also held preliminary discussions with MOE-Water Resources Branch, regarding possible funding of a stormwater pond. Two potential sites have been suggested, one on Highland Creek and the other on the Rouge River. Markham is considering work on conversion of an existing dry pond (designed for quantity control) to extended detention pond (quality control). MTRCA has been working with Metro Parks on a concept that could include a stormwater quality facility at the Brickworks site on the Don River. Metro has expressed interest in acting as proponent on a demonstration project on a Don River tributary, similar to the Emery Creek project.

The Ministry of the Environment has initiated a contract to bring together pertinent information on water quality ponds existing in Canada and the US. This project is intended to lead to the future development of a pond design manual.

There is substantial interest in the pursuit of demonstration scale projects for water quality control. However, few projects have gone beyond the discussion or study stage. The reason for this appears to be a lack of available resources or other resource priorities at all levels of government. Existing budgets for all agencies are fully committed to existing programs and approvals for new demonstration projects are difficult to secure. The problem of funding is aggravated by the cost-sharing which is usually involved, because non-approval by any one agency is sufficient to cause a delay.

### Potential Program Improvements

The main thrust of demonstration projects should be to:

- create functional facilities which will demonstrate the effectiveness of a control measure or increase our knowledge of how to design and operate similar facilities

- provide a useful remedial control measure in a priority area

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provide opportunities for multi-disciplinary design and multi-purpose use (stormwater quality control, habitat improvement, recreational design and use)

involve agencies which will ultimately be responsible for larger scale implementation

provide opportunities for public involvement and mobilizing public support of similar facilities

The principal improvements necessary for the demonstration project program involve getting project construction under way. This will require an infusion of resources specifically dedicated to the program and resolution of outstanding questions of proponentcy and ownership. Trade-offs may have to be considered between multi-agency, multi-use projects, which are often slow in getting started and single or dual purpose facilities which can be undertaken by a few agencies.

### **A. Provide a Dedicated Fund for the Implementation of Demonstration Projects**

Most municipalities have extensive experience with stormwater quantity management, at least from a development control perspective. Stormwater quality management however is a relatively new field and there is little agency experience with project implementation. The demonstration project program can provide an opportunity to reduce the basic reluctance of municipal staff to become involved in stormwater quality issues. In addition, there is a growing recognition of the problems of stormwater quality among many community organizations. The demonstration programs can provide the basis for community involvement in water quality remediation and may yield benefits in terms of increased public support during the Environmental Assessment process and stronger support for environmental spending.

In order to take advantage of the full demonstration program potential, a series of demonstration projects is required. Distribution of these projects across the RAP area would ensure involvement by a number of local and regional municipalities and would maximize the amount of public exposure given to the concept of stormwater quality control. It is anticipated that six demonstration projects, constructed over a three year time frame, would give the desired level of involvement.

The cost of the Emery Creek facility was estimated to be \$ 1.2 million for the pond construction and an additional \$ 0.2 million for disinfection facilities. These costs were exclusive of land costs because of the proposed location, in a park/floodplain area. Annual maintenance was estimated to be \$35 K for the pond and \$7 K for disinfection. All estimates were based upon 1985 dollars. Raising the capital costs to 1989 dollars and making an allowance for additional spending for habitat improvement, tree planting, etc., a unit facility cost approaching \$ 1.8 million may be estimated. Assuming a similar budget for other demonstration sites, total cost of \$11 million dollars would be required, over three years.

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There is currently a reluctance on the part of most municipalities to allocate funds to stormwater quality projects. In order to overcome this for the demonstration projects, an 66 2/3% federal/provincial contribution, amounting to about \$2.4 million annually for three years could be made. Municipalities would be responsible for the remaining \$ 1.2 million annually and for ongoing maintenance. It should be noted that existing federal policy prohibits funding of infrastructure, including stormwater ponds. Federal funding however, may be available based on the research and technological aspects of the pilot program. This matter is to be investigated in the coming months.

If federal participation is not possible, a 50/50 cost sharing arrangement between the province and municipalities should be pursued. This would require a provincial and municipal commitment of \$ 1.8 million (each) over three years. The provincial contribution should be established as a specific budget item so that competition for the funds is restricted to candidate projects within the demonstration site program.

### **B. Establish Multi-Agency Teams to Oversee Demonstration Project Implementation**

Where possible, demonstration project implementation should seek to include a number of remedial measures in order to set a multi-use tone and demonstrate the advantages of ecosystem-oriented design. While the primary focus will likely be on stormwater quality control, the opportunities for sub-projects such as habitat improvement, wetland creation, access improvement and public use enhancement should be actively sought. In order to ensure that the widest range of opportunities are considered in facility design, a multi-disciplinary team should be created to oversee each project.

Experience indicates that the team should be led by the project proponent rather than by a provincial agency. The team should consist of works and parks staff from the regional and local municipalities, MTRCA, MOE and MNR staff. In addition, local community groups should be approached to join the team as a full, or ad hoc member (as their time allows). Non-government organizations (NGOs) active in the field, (eg. Conservation Council of Ontario, Black Creek Project) should also be approached to determine their willingness and interest in joining the team. NGOs may be willing to provide conceptual ideas for consideration even if their resources do not permit active participation.

The Water Quality Improvement Coordinating Committee (WQICC), recently established by Metro as a subcommittee of the RAP's technical advisory committee forms a sound basis from which to draw project team members. The WQICC is chaired by Metro and has access to provincial and municipal staff. Through the RAP it may access the public advisory committee to supplement the public input required under required class EA procedures. The WQICC has established working groups to examine spill response and industrial best management practices. A working group dealing with the Emery Creek facility and a proposed facility on the Don River will be formed if provincial funding for the project is approved.

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The advantages of a committee similar to Metro's WQICC are clear. Chaired by a municipal level of government there is typically a stronger local commitment and a tendency to focus on the more detailed project-specific aspects of the remedial action. Community involvement is more likely because of identification with the municipality and the local focus. Operating within the RAP provides a strategic basis for project justification. Establishment of a standing committee similar to the WQICC should be considered in each of the Regions in order to facilitate implementation of remedial measures such as the demonstration projects.

No costs have been established for the formation or operation of demonstration project teams. It is assumed that existing staff would be utilized. Public and NGO involvement would be on a voluntary basis.

### Potential Program Benefits

The benefits of implementation of the Emery Creek demonstration project, as outlined in the Humber River Water Quality Management Plan included:

#### WITHOUT DISINFECTION OF POND EFFLUENT

- improved fisheries benefit downstream of pond.
- reduce metal loads, sediment loads, solid-associated pollutant loads.
- provides protection against spills.
- test facility for evaluating pond effectiveness in terms of fishery enhancement.
- test facility for optimization of pond design, pollutant removal effectiveness, and load reduction.
- reduce future degradation of the watercourse and contaminant loads to the lake.
- reduction of FC counts.

#### WITH DISINFECTION

- all of above benefits plus further reduction of FC counts.
- improved recreational benefits.

Each of these benefits could be ascribed to additional demonstration projects on other watersheds. It should of course be recognized that the extent and relative impact on the

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overall ecosystem of these projects will be quite small. Basin-wide implementation of similar projects would be necessary to affect significant improvements throughout the watersheds.

Beyond the direct benefits of the demonstration projects, the program would initiate action towards stormwater quality control, in a manner which involved senior governments, municipalities, and the public in a cooperative effort. This is an approach consistent with the intent of the RAP program. The process will provide valuable experience for technical staff in terms of public involvement and consultation, multi-disciplinary design, and ecosystem considerations.

### Dependent Projects

The demonstration project program is independent of other Component Actions cited in this document. Each demonstration project will seek to incorporate Component Actions selected through the RAP process to the greatest extent possible. The demonstration projects will provide opportunities for monitoring the effect of various remedial measures implemented both as part of the project and on the tributary urban catchment.

### Monitoring Requirements

The demonstration pond program will involve a specific monitoring program developed as part of the project design. One of the main purposes of the program is to develop the criteria for efficient operation and to establish the ecosystem benefits of such facilities. A side benefit of the program will be the testing of different monitoring strategies. Monitoring may be expected to involve wet and dry weather influent/effluent sampling, sediment sampling, and biological sampling as well as measurement of physical parameters such as temperature. Opportunities will exist to test monitoring strategies for such things as spills.

### Reporting

Since the demonstration pond program would be operated in part as a research activity, more detailed reporting than would be typical would be required. It is anticipated that a full study report would be completed on an annual basis for a period of 3-5 years. The results and conclusions would be summarized in the annual RAP report.

### Implementation

It is anticipated that the demonstration pond program could be initiated quickly, within a one year time-frame. The Emery Creek project has had substantial pre-design work completed and agreement has been reached with Metro Works in regard to proponentcy. Other potential project sites could be selected based on work completed in the Humber, Don and Rouge studies or ongoing development/redevelopment opportunities. Preliminary selection would be

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referred to the Technical Advisory Committee, with detailed site feasibility analysis being contracted out.

The desire to implement projects on a dispersed geographical basis in order to maximize exposure and opportunities for public and municipal involvement should be recognized in the site selection process. A strong recommendation for selection of a particular site would be willing proponentcy on the part of the municipal authority.

### Potential Delays

The potential for delay in implementing the demonstration pond program is high for many reasons. Demonstration projects in developed areas will have the greatest potential for delay. Factors which could result in significant delay are listed below:

- o Metro Works has initially requested 85% provincial funding for this project, The funding arrangement is unprecedented in terms of a capital works project sponsored by MOE. While it would be made clear that this was to be a special case aimed at launching municipal stormwater quality control, concerns will be felt with respect to raising expectations in regard to long-term funding.
- o municipal capital support for the program will be relatively low in the short term under this program, but ongoing maintenance costs may be of concern and may prevent municipal proponentcy.
- o ponds, especially in retrofit situations will usually be located in park or floodplain areas. Approvals from MNR, MTRCA, and municipalities may be subject to restrictions which could require increased expense or render the project infeasible.
- o ponds or other treatment facilities which form part of existing stormwater systems are subject to Class EA. Consultation with the local public will be necessary, even if the RAP process, with its public consultation program, recommends a particular facility. Opposition to stormwater ponds may be anticipated based on the "not in my backyard" (nimby) syndrome.

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### Summary Information for Implementation

Component Action:	Demonstration Stormwater Ponds Program
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Stormwater Program (policy/guideline) Public and NGO Improvement Programs
Implementation Responsibility:	Municipalities
Funding Responsibility:	Province, Municipalities; Federal participation to be determined
Additional Costs Range:	\$ 11 million over 3 years
Monitoring Requirements:	Project specific
Reporting Requirements:	Full project report
Time-frame:	3 years
Potential for Delay:	high
Potential Reasons for Delay:	proposed funding structure agency approvals class environmental assessment

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### Reference Documents

TAWMS, 1986, "Humber River Water Quality Management Plan"  
TAWMS, Technical Report #9, 1986 "Feasibility Study of Costing of Proposed Pollution Control Measures in the Humber Sewershed"  
TAWMS, Draft Report, 1989 "Summary Report: Strategy for Improvement of Don River Water Quality"

### COMPONENT ACTION #4.3.3: Implement Federal Leaded Fuel Regulations

Lead is one of the most common contaminants found in stormwater runoff from urban areas. The Stage 1 RAP report on existing conditions, estimated that over 75% of the total lead load to the waterfront came from rivers, primarily as a result of urban runoff flushing the contaminant from urban surfaces.

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The implementation of the federal leaded fuel regulations, is of course not a Metro Toronto RAP initiative, but the RAP will benefit from it. It is included as a Component Action here because it will have a significant impact on a contaminant that other actions (eg. stormwater ponds) will be designed to remove. This should be borne in mind while considering the selection of options.

### Existing Programs

Emissions of lead into the air from car exhausts contributes to the lead inventory in the human body through various pathways: air (29%), water (4%) and food (67%)(Env. Canada, 1983). Continual exposure to low lead levels in the environment is known to produce adverse health effects at blood lead levels of 10 to 15 ug/dL. At this level published health studies indicate neurobehavioural effects of young children, lower birth weights, and higher risk of pre-term delivery of babies. The contribution of gasoline lead to blood lead levels at present is estimated to be 1 to 2 micrograms per decilitre (ug/dL). The concentration in western Canada may be higher because of the higher proportion of leaded gasoline sales in that market (Sitwell, Armstrong, 1988). In urban areas of Ontario, it is estimated that about two percent of young children at present have blood lead levels exceeding 15 ug/dL (Sitwell, Armstrong, 1988).

Deposition of lead from the atmosphere and surface runoff are the major sources of lead contamination to aquatic systems. the International Joint Commission in its report on the Great Lakes (IJC, 1980) stated that nearly 8 million tonnes of lead per year entered Lakes Huron, Ontario, Erie and Superior. More than 3 million tonnes were deposited by direct atmospheric transport. The transport feature is further demonstrated by lead content of rain which, in Toronto, has an average value of 50 ug/l (IJC, 1980). It is also stressed that a high percent of lead in lake sediments originated from atmospheric deposition and surface run-off contributing to a net increase in the lead burden of aquatic systems over time.

The concentration of lead in surface waters are generally low in the order of 1-12 ug/L in the Great Lakes (The Royal Society of Canada, 1986). This is due, in part, to the tendency of lead to become deposited into the sediments. In most quantitative dietary lead budgets, water is represented as rather insignificant (eg. EPA, 1986).

The programs currently in existence are working towards total removal of lead from car exhausts with the exception of those vehicles that have engines where there is a high risk of valve seat recession. These include agricultural equipment, boats and heavy duty trucks. Lead is added to gasoline as an economical way of enhancing octane. It serves to lubricate valve parts in engines designed to run on leaded gasoline.

In 1982, 61% of all sources of lead was from car exhausts. With the introduction of catalytic converters and the advancement of the deadline for the elimination of lead from gasoline to

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Dec. 1990, National emissions of lead from car exhausts have decreased to 32% of all sources (Personal Communication, 1989).

### Potential Program Improvements

None identified at this time.

### Potential Program Benefits

Program benefits associated with the phase-out of leaded gasoline will be to lower blood lead levels by 2 ug/dL or greater (Sitwell, Armstrong, 1988). A decrease in lead concentrations in sediments should also be observed over time. The program, combined with other best management practices will reduce the contaminant levels of lead in stormwater runoff. Aside from bacteria, the most significant contaminant loads from stormwater runoff are for the heavy metals: lead, zinc, copper and cadmium. The leaded fuel regulations will, at a minimum, render the sediment collected in treatment ponds or other facilities less toxic.

### Dependent Projects

The advancement of the phase-out of leaded gasoline is not dependent upon any other projects in the RAP. However, it will require oil companies to convert refineries and to develop suitable alternatives to lead additives two years faster than expected. Total cost incurred for the conversion is expected to be approximately 600 million dollars.

Other projects that are not dependent but will also reduce exposure to lead are:

- amendment of secondary lead smelter regulations and preparation of a code of practice to improve control of fugitive lead emissions.
- implementation of the Canadian Acid Rain Reduction Program which will result in reduced lead emissions at primary smelters.
- study of the disposal of lead acid batteries.
- amendments to the Transportation of Dangerous Goods Regulations which will define leachate containing greater than 5 milligrams of lead per litre as hazardous waste.
- support of voluntary industry phase-out of use of lead solder in food cans.
- recommending to appropriate agencies that the use of lead solder in plumbing for drinking water be discontinued.
- revise drinking water guidelines for lead.

The phase-out of leaded gasoline is related to all Component Actions which address stormwater runoff, since lead is one of the primary contaminants of concern.

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### Monitoring Requirements

Continuation of annual sampling currently being undertaken at retail outlets and monthly sampling at refineries. The impact of the regulations should be monitored at pilot pond facilities, if implemented, to assess the effect of the regulation on the quality of stormwater runoff.

### Reporting

Refineries are required to report quarterly on lead additives in gasoline to Environment Canada - Environment Protection.

### Implementation

The program is being implemented.

### Potential Delays

No delays are anticipated.

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### Summary Information for Implementation

Component Action:	Federal Leaded Fuel Regulations
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	All actions related to stormwater
Implementation Responsibility:	Federal
Funding Responsibility:	Private sector
Additional Costs Range:	none applicable to RAP
Monitoring Requirements:	part of their stormwater monitoring
Reporting Requirements:	none applicable to RAP
Timeframe:	underway, phase-out by end of 1990
Potential for Delay	low
Potential Reasons for Delay	none

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### References

A. Jaques, Environment Canada, Personal Communication, 1989.

Environment Canada, Control Options for Lead Phase-down in Motor Gasoline, EPS 3-AP-83-1, 1983.

International Joint Commission, Report of the Aquatic Ecosystem Objectives Committee, Great Lakes Science Advisory Board, 1980.

Ministry of the Environment, B. R. Dilke, In Place Pollutants Program - Toronto Waterfront data Assessment, 1985.

Sitwell, J., Armstrong, J., Background Information Related to the Canadian Coalition for Lead Free Gasoline Brief, 1988.

The Royal Society of Canada, Lead in the Canadian Environment; Science and Regulation, 1986.

### COMPONENT ACTION: # 4.3.4

### Long Range Strategy for Implementation of a Storm water Quality Program

Uncontrolled urban drainage's impacts on natural receiving water bodies are very evident. These impacts include physical changes to a drainage area's hydrology and hydrogeology and to a receiving waterbody's morphology and water quality characteristics. The changes to the receiving waterbody not only include the traditional problems of increased erosion and flooding and the need for sediment control but also includes stresses or destruction of aquatic habitat and human health risk of polluted recreational areas and drinking water supplies that must be treated. Urban drainage problems are not new but are becoming more recognizable as point source pollution is abated.

Currently most urban drainage systems are designed for quantity control (ie. flooding and basement protection). The current practices of urban drainage are inadequate for the protection of some of the basic water uses (recreation and fisheries). If these practices continue, further degradation and loss of water uses will occur in our receiving waters.

The lack of a comprehensive provincial policy and strategy on new urban drainage has led to confusion amongst the development industry, municipalities and provincial agencies about how to best implement controls for water use protection. As a result, the implementation of water use protection controls is inadequately considered by most municipalities across Ontario. In addition, the lack of this policy produces delays in land development approvals due to the number of agencies involved in the approval process, duplication of efforts and conflicting requirements.

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It should be noted that the current practice of urban drainage (separated sanitary and storm sewers) has not been the only urban drainage practice. Combined sewers were generally constructed prior to the 1960's and this practice permits the release of untreated sanitary sewage during storm events. This form of urban drainage still represents a sizeable portion of area in many of our older municipalities even though it is not currently being approved .

There is a clear need for a provincial policy and strategy for the control of urban drainage practices to ensure water use protection.

### Existing Programs

In 1980, the Province established the Urban Drainage Policy Implementation Committee with representatives from the Ministries of Natural Resources (MNR), Environment (MOE), Municipal Affairs (MMA), the Municipal Engineers Association (MEA) and the Association of Conservation Authorities of Ontario (ACAO). The Committee's mandate was to examine the Canada-Ontario Agreement (COA) model drainage policies and provide recommendations on their use in Ontario. It concluded that adequate legislation existed to support these policies and administrative procedures were available to adopt and implement them. The implementation committee initiated the Urban Drainage Management Program (UDMP) for new developments and prepared two supporting technical guidelines:

Urban Drainage Design Guidelines (1987); and

Guidelines on Erosion and Sediment Control for Urban Construction Sites (1987).

The main emphasis of the Urban Drainage Management Program is on quantity control. This is reflected in the Urban Drainage Design Guidelines which only makes brief reference to stormwater quality management. The Planning Act provides the statutory framework for land use planning and implementation at the municipal level. Since the UDMP is not a policy under the Planning Act, it is essentially a voluntary program with implementation left to the local municipalities. Water pollution problems for existing development are also not addressed under the UDMP.

The Urban Drainage Management program advocates a pro-active planning approach to stormwater management which is described in detail in the Urban Drainage Design Guidelines (MOE et al, 1987). The first level of planning is encompassed in a Watershed Plan (prepared by the appropriate Conservation Authority) that defines water targets for various areas of the watershed. Within these areas, targets are established primarily for water quantity (flooding and erosion controls) and in some cases for water quality (point sources discharges like municipal sewage treatment plants). Where appropriate, these targets would be addressed in a municipality's Official Plan.

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The second level of planning is the preparation of a Master Drainage Plan (MDP) for subwatersheds of the larger watershed plan. At this level, the municipality determines the Stormwater Management (SWM) measures such as approximate sizes and location of channels, quantity and quality ponds and other Best Management Practices. Also, at this level, a Secondary Plan should be prepared for specific areas within the subwatersheds jointly with the Master Drainage Plan.

The third level of planning is the draft plan of subdivision where the preliminary Stormwater Management (SWM) Plan should be prepared. Based on the street and lot layouts, the major and minor systems and how the facilities will meet the constraints and requirements of the MDP will be defined. The Final SWM Plan will include the detailed design drawings documenting how the SWM measures meet the targets of the MDP and the Watershed Plan. Through this planning process it is envisioned that the chicken-pox approach, where on-site detention is built for every individual development, will be avoided.

Some initial steps have been taken to provide provincial guidance on stormwater quality control requirements for new developments. Central Region Offices of MNR and MOE, in cooperation with Water Resources Branch, MOE have prepared a draft document entitled "Interim Stormwater Quality Control Guidelines For New Development" (MOE and MNR, 1989). The draft guidelines are being revised based on comments received from members of the Urban Drainage Policy Implementation Committee (UDPIC), municipalities, Conservation Authorities, various interest groups and MOE/MNR staff.

To address the impacts of combined sewer drained areas on water use, the MOE is currently developing a position on the abatement of these drainage systems. Presently municipalities are able to request funding from MOE for Pollution Control Planning (PCP) studies. The MOE will also technically assist municipalities undertaking water pollution control planning including the abatement of Combined Sewer Overflows (CSOs).

A PCP study outlines the alternatives, costs, and extent to which pollution control measures can be used to improve water quality for a defined area. It emphasizes a coordinated approach to correct problems and requires a detailed analysis of alternatives to deal with point and non-point sources such as industrial and sewage treatment plant discharges, combined sewer overflows, stormwater runoff and agricultural runoff.

Yet to be addressed is the development of a position/policy for quality control for separated stormwater systems in existing developed areas.

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### **Potential Program Improvements**

#### **A. Apply the Interim Guidelines to New Development in the RAP Area**

The Interim Stormwater Quality Control Guidelines For New Development have been jointly prepared by MOE and MNR to address the need for stormwater quality management in developing areas of the Province. The control of stormwater encompasses the goals and mandates of both Ministries for the prevention of loss of life, minimization of community disruption and property damage due to flooding, and the protection and maintenance of surface and ground water resources sufficient for aquatic life and recreation.

Specifically, the purposes of the guideline are:

- a) To provide municipalities with Provincial information and requirements for the review of planning documents and planning proposals for stormwater management facilities for water quality control for new development.
- b) To provide guidance to proponents for stormwater management for water quality control.

In addition, these guidelines provide:

- c) Guidance to MOE and MNR staff in the review of planning documents and development proposals.
- d) Guidance to MOE and MNR staff in the requirements, evaluation and approval of stormwater management facilities for stormwater quality control.

At the present time urban drainage controls contained in local planning documents (draft Plans of Subdivision and Stormwater Management Plans) rarely receive MOE review. This is because there are no accepted MOE stormwater quality management guidelines and a lack of staff resources.

To alleviate the lack of guidelines the Interim Stormwater Quality Control Guidelines For New Development was developed. To implement these guidelines and ensure that MOE concerns are met would require significant staff resources. MNR staff have also identified staffing limitations for implementing an urban drainage program, and are examining the merits of transferring some of these responsibilities to CAs and municipalities. At the present time, limits on staff resources are the primary impediment to implementation of any program of stormwater quality control.

Staffing efficiencies could be achieved through focusing MOE efforts on municipal plan input, and transferring responsibilities for detailed plan review and approvals to other agencies

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Urban drainage requirements may include stormwater ponds, buffers and setbacks, infiltration trenches, and source control options such as roof leader disconnection, grass swales, and drains which encourage ground infiltration of storm runoff. Urban drainage management costs can be reduced by effectively integrating with other services and facilities.

No estimates have been made in terms of overall costs for this potential improvement. Further discussion is required to clearly define responsibilities and determine staff resource needs.

### **B. Conduct Pollution Control Planning Studies to Prioritize Sites for Retrofit**

The Remedial Action Plans in Ontario's seventeen areas of concern have identified problem sources and solutions at a macro scale of detail. A Pollution Control Planning (PCP) study provides a coordinated approach to the correction of problems and requires a detailed analysis of alternatives to deal with point and non-point sources such as industrial and sewage treatment plant discharges, combined sewer overflows, stormwater runoff and agricultural runoff. While the information contained in a RAP is strategic in its level of detail, the PCP is more detailed and project specific in its orientation.

MOE provides funds to assist municipalities in carrying out PCP studies. The formula for determining MOE's grant is based on the present municipal population and guarantees that the grant will not be less than 50% of the cost. For a population equal or greater than 4,250 the municipality would receive 50%.

It is estimated that for the seventeen RAP areas the total PCP study costs would be approximately \$ 6,000,000. The MOE contribution would represent approximately \$ 3,000,000. Within the Metro Toronto RAP area, it is estimated that the completion of PCP studies would cost about \$ 0.9 million, half of which would be the responsibility of the province. To date approximately \$ 900,000 has been spent on PCP studies in Ontario's RAP areas.

### **C. Require Redevelopment to Institute Stormwater Quality Control**

Municipalities may institute by-laws to ensure the implementation of stormwater quality control as a condition of approval of redevelopment. To be cost-effective these stormwater quality controls should be considered at a master drainage planning level as opposed to a neighbourhood or a single development level. This would ensure that redevelopment proceeds in a coordinated manner instead of on a piecemeal basis which is not cost effective.

The Interim Stormwater Quality Control Guidelines For New Development could be used to address the need for stormwater quality management in redeveloping areas of the Province. To implement these guidelines and ensure that MOE concerns are met additional staff

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The Interim Stormwater Quality Control Guidelines For New Development could be used to address the need for stormwater quality management in redeveloping areas of the Province. To implement these guidelines and ensure that MOE concerns are met additional staff resources would be required. These staff resources would depend upon the amount of redevelopment that is occurring in a municipality. As stated earlier, staffing efficiencies could be achieved by focusing MOE efforts on municipal plan input, and transferring responsibilities for detailed plan review and approvals to other agencies already involved in such activities. Extensive planning, negotiation, and changes to existing legislation would be required to accomplish such a transfer.

As in the case of improvement A, further discussion of responsibility is required before estimates can be made of the required staff resources.

### **D. Retrofit Ponds/SWM Controls at Existing Problem Sites**

In September, 1989 the "Strategy For Improvement of Don River Water Quality" was released. This strategy provided a number of different control options for various levels of water use protection. To attain a fully acceptable water quality level that would support a significant warmwater fishery and recreational use (ie. swimming) the document stated that the following control options would be required:

- spill control;
- CSO control; and
- stormwater quality control (ie stormwater ponds) in new and existing development.

This level of water use protection has been estimated to cost \$ 750 to \$ 900 million on the Don River alone. A significant portion of this cost has been attributed to retrofitting existing areas with stormwater quality controls (\$ 200 to \$ 540 million).

Stormwater control facilities in developed areas are, at present, usually for the purpose of quantity control. With modifications, these facilities can be made to perform a dual function. To determine the cost of retrofitting all existing areas with stormwater quality control problems in all RAP areas is a large task. However, the implementation cost can be estimated to be in the order of several billion dollars.

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A stormwater management facility retrofitting program that is going to cost billions of dollars must be carried out over a long time frame to be financially implementable. Considering that a long time frame would be required, implementation should be carried out by constructing stormwater quality controls during the redevelopment process. This would provide the least disruption of the construction activity.

### A Possible Framework for Implementation

The four previous sections outlined well defined areas where urban stormwater management controls can be implemented. However, each one of the sections lacked a framework in which they could be coordinated, integrated and managed.

The proposed framework is similar to one outlined in the "Urban Drainage Design Guideline" and mentioned earlier in this chapter. This framework is shown in figure 1 and presents the interrelationships between:

- Watershed Plans and Municipal Official Plans;
- Master Drainage Plans and Municipal Secondary Plans;

and how these plans succeed in developing the Stormwater Management Plan for a new subdivision.

The Watershed Plan would define the existing and potential water uses for specific geographical regions of the watershed. These water uses would include:

- recreational (ie. swimming);
- municipal, industrial, commercial and agricultural; and
- aquatic life (ie. fish) and their habitat.

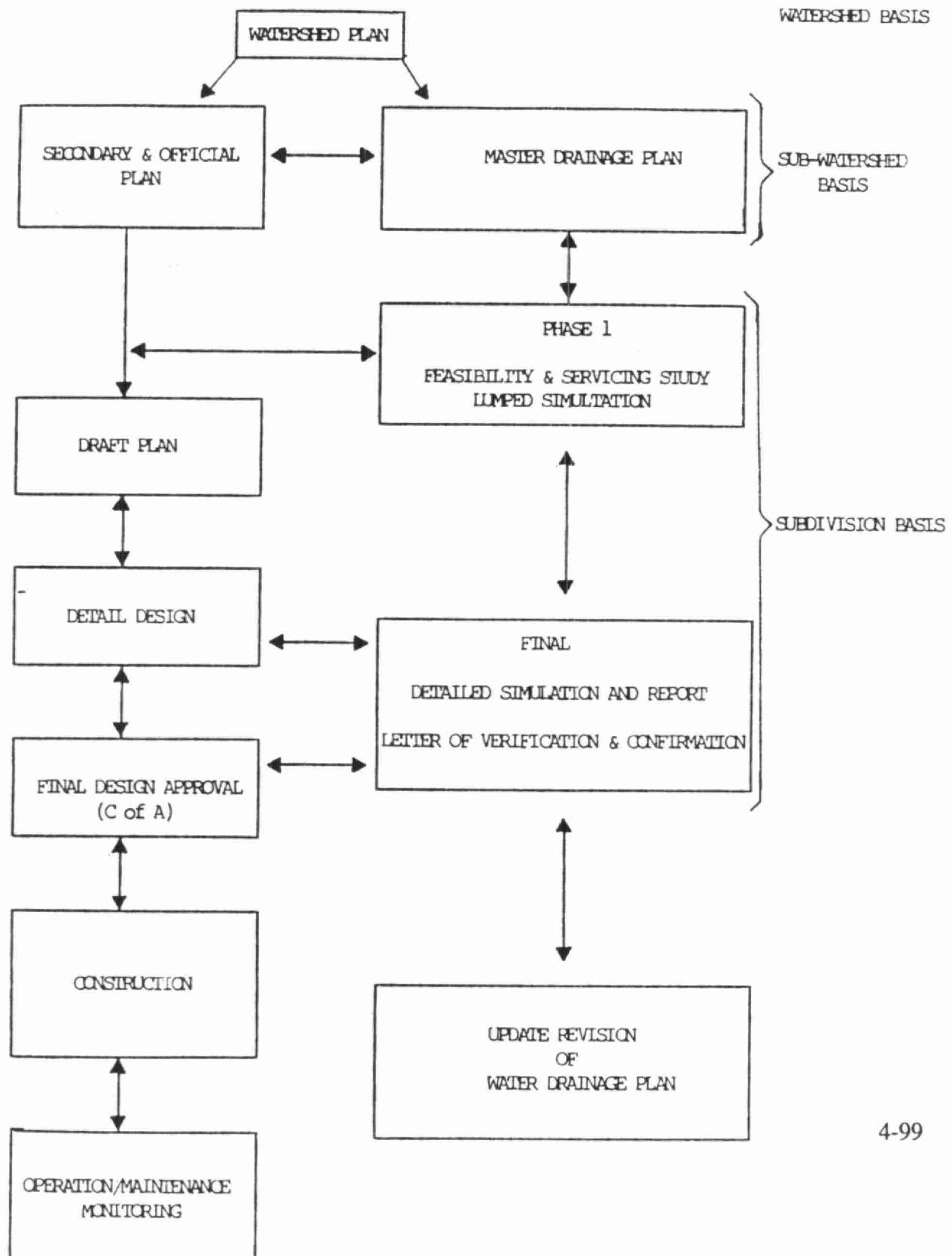
Addressing these water uses on a watershed basis ensures that the hydrology, biology, hydrogeology and the stream morphology aspects of a well defined ecosystem are examined, evaluated and managed appropriately.

The Municipal Official Plan will incorporate the information developed in Watershed Plan to protect waterways from incompatible urban drainage methods and land uses. The Official Plan could define discrete land or waterway areas that are sensitive ecological units. In addition, Official Plans could prescribe Master Drainage Plans to be carried out concurrently with Municipal Secondary Plans.

Municipalities will be encouraged to develop Master Drainage Plans which will address the constraints identified by the respective Watershed Plan. These plans will typically contain allowable runoff rates, stormwater flow routes, approximate sizes and locations of channels and detention ponds. In addition to addressing stormwater quality control in their Official

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FIGURE 1: STORMWATER MANAGEMENT PLANNING & DESIGN PROCEDURES



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Plans, municipalities should also be encouraged to develop the water quality control component of a Master Drainage Plan. The water quality component would include requirements for reducing impacts of stormwater on water quality and for erosion and sediment control. These plans should incorporate the watershed plans of the local Conservation Authority, if available, which identify water quality targets and constraints along river systems. MOE provides information to Conservation Authorities for the establishment of water quality targets. The natural boundary for planning for stormwater management is the sub-watershed.

Secondary plans provide detailed land use plans and policies for a portion of the area covered by the Official Plan. If a secondary plan is to be prepared, the Official Plan can be limited to the more general policies outlined above and the more detailed policies can be recommended for inclusion in the secondary plan. The level of detail in an Official Plan will, therefore, depend on the planning approach adopted by a municipality.

A plan of subdivision must have all the conditions placed on it by a municipality cleared and be approved by the Minister of Municipal Affairs or a delegated municipality before it can be registered and the lots conveyed.

Stormwater management plans will normally be required from the developer prior to, or as a condition of draft approval. MOE may require a preliminary Stormwater Management Plan or conceptual design for stormwater quality control prior to draft approval for both subdivision and condominiums.

A Stormwater Management Plan should be based on the goals and objectives of the Official Plan and Master Drainage Plan and/or subject to approval of MOE, MNR and, if applicable, the local Conservation Authority. The plan should indicate the impact of the proposed development on water quantity and quality and any proposed mitigation measures to overcome drainage problems. It should also contain detailed design studies addressing such things as potential impacts of land use changes including impacts on downstream users, landscaping techniques to retard and possibly reduce runoff and, thus, sediment load in stormwater, sediment controls to be used during site preparation, construction and post-construction, monitoring and maintenance of stormwater ponds and on-site control techniques during and after construction, ownership and operation.

To assist in implementing the above framework existing technical guidelines have to be upgraded or new ones developed. Guidelines to be upgraded include the "Erosion and Sediment Guidelines for New Development" and the "Urban Drainage Design Guidelines". Guidelines to be finalized include the "Interim Stormwater Quality Guidelines for New Development" and the "Interim Stormwater Pollution Control Pond Design Guidelines". New guidelines and manuals to be developed include:

- Technical Guidelines for Preparing a Watershed Plan;

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- Technical Guidelines for Preparing a Master Drainage Plan; and
- Stormwater Quality Management Control Options Manual(s).

In addition to development of guidelines and manuals continuing research and development of new and innovative control options must be carried out. Some of the current research is described in the Dependent Programs section. Training and development of provincial, conservation authority and municipal staff on the most current technology is essential.

### **Potential Program Benefits**

A long range strategy will provide an organized, consistent approach to the solution of urban drainage problems province-wide as well as in specific areas of concern. Careful development of the strategy will ensure that the most cost-effective methods are employed to effect substantive improvements in urban drainage quality.

### **Dependent Projects**

The Ministry of the Environment has funded programs for water quality management and studies for pollution control technology development. These programs and studies are briefly described below.

The Pollution Control Planning (PCP) Studies Program was initiated by the MOE in 1986 to help municipalities determine the costs and effectiveness of alternative pollution control measures that can be used to improve water quality in a defined area. It emphasizes a coordinated approach to correcting problems and requires a detailed analysis of alternatives to deal with point and non-point sources such as industrial and sewage treatment plant (STP) discharges, combined sewer overflows (CSO), stormwater runoff and agricultural runoff. A PCP study normally consists of three main phases:

- 1) define the nature, cause and extent of pollution;
- 2) evaluate control options and propose alternative remedial measures; and
- 3) develop a Pollution Control Plan and recommend an implementation program.

The PCP Studies program is primarily concerned with water quality problems in existing development. Thus far 14 studies have been initiated. MOE will provide 50% funding for larger municipalities and up to 85% for smaller municipalities.

MOE has funded some capital works for water quality improvement. Under the Metro Toronto Waterfront Water Quality Improvement Program (WWQIP), approximately \$32 million was spent for sewer separation projects between 1984 and 1988. Through WWQIP,

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MOE has also funded the construction of an underground storage tank at the Eastern Beaches in Toronto to detain CSO's and stormwater runoff for subsequent treatment at the Main STP.

MOE also funds capital works for beach improvement under the \$30 million/year Beach Improvement Program.

Finally, the MOE is involved in several technology development projects:

### Fanshawe Park Ultra-Violet Disinfection

In this project, done in cooperation with the Upper Thames River Conservation Authority, a plastic curtain was set up to create a pool around a beach. Water on the beach side of the curtain is pumped through an ultra-violet disinfection unit. The system has been operated and monitored for two years to identify problems and evaluate the effectiveness of this technology.

### Hamilton CSO Real-Time Control Demonstration Project

This is a research project being done at the Regional Municipality of Hamilton-Wentworth. The purpose is to design, install, operate and evaluate a microcomputer-based Real-Time Control (RTC) system at the Royal Avenue CSO diversion structure to demonstrate the feasibility of this technology.

If the pilot site is successful, a theoretical operating strategy for a larger portion of Hamilton's trunk sanitary interceptor will be developed. The potential for transferring this technology to other municipalities will be evaluated.

### Dunker's Flow Balancing System Feasibility Study

In 1985, the City of Scarborough undertook a Pollution Control Strategy Study. The study identified a program of relief measures to reduce the quantities and frequency of combined sewer overflows both to Massey Creek and Lake Ontario. One of the proposed relief measures is the use of underground tanks for intercepting overflow. The City has initiated a feasibility and costing study of the Dunker's Flow Balancing System as an alternative to the tanks. The Dunker System consists of a series of "floating tanks" or cells in the water. Each cell is formed by curtains of heavy vinyl. As stormwater or CSO enters the system, lake water is displaced through an opening in the curtain. After the rain stops, the collected stormwater is pumped to a sanitary sewer which flows to a STP.

### Ponds and other Best Management Practices (BMPs) Design Manual

MOE has also initiated a project to develop a design manual for ponds and other BMPs for stormwater quality management. The study for the first phase of the project is ongoing. The

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goal of the study is to determine the effectiveness of BMPs for stormwater quality management in Ontario based on the existing data, to provide an integrated approach for BMP selection, to develop guidelines for their design, operation and maintenance, and to outline the work program necessary for producing a BMP design manual.

### **Monitoring Requirements**

Ambient monitoring requirements should be met as part of the RAP monitoring, as stormwater strategies are implemented.

### **Reporting**

The long range strategy will be reflected in the reporting efforts of other initiatives; for example, the Interim Urban Drainage Quality Control Guidelines.

### **Implementation**

The long range strategy for implementation of stormwater quality control must always be sensitive to current public priorities and changes in technology. Whether the priorities are influenced by the impacts of stormwater on receiving waters, the economic burden of stormwater management on real estate consumers and municipalities or technological advances in the fields of municipal services design and wastewater treatment, the strategy must be able to anticipate and respond to changing demands.

In order to be able to anticipate and respond to changes those responsible for Ontario's stormwater quality program must monitor public expectations as well as technological developments. The successes and, more importantly, the failures of the stormwater quality control program must be and will be monitored by provincial staff, municipal staff and the public. These groups will provide the feedback that fine tunes the strategy.

Implementation of the various components of the long range strategy will require endorsement by MOE's Management Committee and Ministerial approval.

### **Potential Delays**

Further development and the implementation of the long range strategy will require input from many sources. The very large capital and staff resource costs associated with stormwater controls is likely to cause delay.

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**Summary Information for Implementation**

Component Action:	Long Range Strategy for Implementation of a Stormwater Quality Program
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Stormwater Policy Development (4.3.1) Pilot Pond Program (4.3.2) Basin Plans (Humber, Don, Rouge)
Implementation Responsibility:	Province/MTRCA/municipalities
Funding Responsibility:	Province/MTRCA/municipalities
Additional Costs Range:	staff resources to be determined capital costs for retrofit estimated to be in the billions of \$
Monitoring Requirements:	to be determined
Reporting Requirements:	none under RAP
Time frame:	long term
Potential for Delay:	high
Potential Reasons for Delay:	high costs

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### REMEDIAL INTENT #5

#### INCREASE PUBLIC AWARENESS AND PUBLIC INVOLVEMENT IN ENVIRONMENTAL PROGRAMS

##### Summary of the Problem

One of the basic principles of remedial action plans is that they should be community based, involving the public in both the development and the implementation of the plan. This is of particular importance to the Metro Toronto RAP because the majority of problems are caused by the urban concentration and infrastructure.

Discussions with the concerned citizens, interest groups, and agency officials all have pointed to the need to increase the awareness of the environment and the public's impact on it. The remedial actions contained in this section have been prepared based on the recommendations in previous studies, discussions with the public and consultation with agency staff. Efforts have been made to elicit information from various interest groups active in environmental programs or the promotion of environmental awareness. These efforts have only been partially successful and it is anticipated that many additional ideas and potential actions will be generated during the discussions surrounding this paper and the selection of options for inclusion in the Draft RAP.

##### REMEDIAL ACTION # 5.1:

##### Increase Public Access to Studies and Reports on the Environment and the Metro Toronto RAP

A growing segment of the population is increasingly concerned about environmental issues. Information is provided by the media as issues arise, and by government agencies upon request, and by non-government organizations (NGOs) as part of their educational activities. In general however information is difficult to secure, especially for those who are concerned, but not involved in environmental issues on a day-to-day basis. In addition, the information provided, especially by the media and government agencies is usually issue specific and does not provide the holistic view which is fundamental to the ecosystem approach and thinking which the RAP seeks to promote.

The Metro Toronto RAP has conducted a public involvement program during the development stage of the RAP. The public involvement program will continue through the implementation. The specific objectives established for the RAP public involvement program during the implementation phase include:

- maintain public interest in and awareness of local water quality issues;

- provide a continuing basis for broad community support for RAP implementation;

- ensure that the RAP remains a continuous priority for implementors;

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monitor implementation of remedial actions and track progress under the plan; and  
support the development of a consensus on revisions or modifications to the RAP.

Most agencies and many NGOs have active communications programs. Many of the programs will be of assistance to the RAP in achieving its objectives. There is a need however to provide information specific to the RAP, at varying levels of detail, in order to keep participants and interested observers informed and to promote a climate where the RAP will receive ongoing input and ideas.

The following Component Actions suggest methods for disseminating information related to the RAP at various levels of detail.

### COMPONENT ACTION # 5.1.1:

#### Establish a Continuing RAP Communications Plan

There will be limited public awareness of the implementation phase of the Metro Toronto RAP. Although many of the remedial actions undertaken will warrant media attention at the time of announcement, implementation will often require many years and progress will be measured initially by the fact that there is a commitment to action. Many of the remedial programs will be small and seemingly inconsequential when viewed in isolation. Reporting of progress individually on these initiatives will not provide a useful picture of overall remediation, except to those who are actively involved on a continuing basis. There will be a need to develop a RAP strategy which seeks to take advantage of existing communications channels and which also allows more detailed and integrated information on RAP implementation to be made available to the public and agencies actively involved in the RAP.

The Metro Toronto RAP must deal with many environmental issues. It is considered important that information be provided on progress on a broad holistic basis in order that the public and agencies are aware of the linkages which are fundamental to the ecosystem approach. It is recognized however that the actions required under the RAP will encompass so many fields that active involvement in all actions will be difficult for individuals, many NGOs, and some agencies. It is expected that many will choose to focus their involvement on specific projects, component programs, or geographical areas. This focus will allow more active participation and will generate information needs which are more detailed and which can not be satisfied by a broad communications strategy. There will therefore be a need for a resource centre and/or a mechanism for putting people in touch with existing information sources.

The objectives of a RAP communications plan would be twofold:

to provide an ongoing source of information on RAP implementation at a level of detail useful to existing communication channels including media and community or interest group newsletters;

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to provide a comprehensive documentation of RAP progress on all selected actions, research, and monitoring, consistent with the ecosystem nature of the plan.

The communications plan would be directed at two audiences, the concerned but non-participating citizen, and the parties involved in RAP development and implementation. This latter group would include those who have been involved in the RAP development process (individuals, public groups, municipal representatives and agency staff), and additional groups and individuals who choose to become actively involved in RAP implementation.

### Existing Programs

Communications during the RAP development phase have been divided between two programs: development and maintenance of a public consultation program; and dissemination of public information.

The public consultation process has received the greatest attention from the RAP team during the RAP development phase. Activities have changed over the course of RAP development, in response to RAP team contacts and interaction with the public. The emphasis throughout however has been on informing the public of opportunities for involvement in the RAP development process and the provision of various means and forums for this involvement.

Some of the activities pursued by the RAP have included:

- o development and use of a Metro Toronto RAP logo
- o production of promotional material (buttons, fridge magnets, brochures, poster displays)
- o staff participation at shows and festivals
- o staff speaking engagements
- o production of newsletters and information packages
- o sponsoring of workshops
- o production and distribution executive summaries
- o production and distribution (more limited) of major reports
- o maintenance of limited RAP library
- o conducting a transit and newspaper ad campaign to raise the RAP profile and indicate opportunities for public involvement
- o development and facilitation of a public consultation framework which allows varying levels of involvement from receipt of mailings, to participation in periodic public meetings, to full participation in an advisory role at monthly meetings

The goal of these activities has been to establish a mechanism for continuing participation in the RAP development process. It has been understood from the beginning that involvement would have to be long-term in nature and would be expected to continue through RAP implementation.

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The budgets associated with the Toronto RAP communications program have varied from year to year, but have been in the order of \$ 150 K/year. This budget has been divided between the Public Advisory Committee process and more general public information on 60/40 basis.

Operation of the communications plan for several years has led to the following observations:

- o participation in shows, at speaking engagements, and in forums, requires a major commitment of time on the part of technical staff. There has been a very limited ability for the RAP to pursue opportunities, even when non-RAP staff from participating agencies are drawn upon.
- o information dissemination at shows and other events has been assisted by "piggy-backing" onto the participation of NGOs participating in the RAP process. This appears to have been successful and should be pursued in future.
- o while there is tremendous public interest in environmental programs, it is evident that there is an equally tremendous range in the time available to individuals and volunteer groups to participate or even keep themselves informed. Communications initiatives must recognize this, making available different levels of information ranging from 1-2 page summaries to very detailed information.

### Potential Program Improvements

As the RAP moves into the implementation phase, the communications strategy will of necessity change. While there will be a continuing need to inform the public of opportunities for involvement, the emphasis should be placed on providing information on progress to active participants. Seeking to take advantage of existing communications channels, a communication plan would include news releases and newsletters to regularly announce milestones and provide the public with regular feedback about the progress of the RAP.

The communications plan would also include a report that would document, at the end of each fiscal year, the details of implementation including reporting what funds have been spent on what projects, a description of future projects and changes to the plan. This report should provide an overview of progress, as well as details of success and problems.

The communications plan would keep people informed of the results of RAP implementation and would promote an interest in water quality and RAP issues. It would provide the information necessary for continuing input from public groups and agencies, through the established RAP framework.

The single improvement proposed is therefore that a continuing RAP communications plan be established.

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### **A. Establish and Fund a Continuing Communications Plan**

A communications program should be established with its orientation towards reporting of RAP progress in remedial action implementation and restoration of beneficial uses. The program should seek to tap media channels through news releases, community newsletters and through provision of the RAP newsletter. These efforts would be aimed at those with concerns, but limited time for involvement. In addition, the RAP newsletter should be distributed regularly to those groups which have become involved in the RAP process. A annual RAP report would be published with distribution to a core group including PAC and TAC representatives, and groups or individuals with history of active participation. The availability of the annual report would also be advertised through the RAP newsletter and a press release.

In order to operate the communications plan, a staff resource, on either a permanent or contract basis, would be required. The person would be responsible for collecting and filing all RAP materials, preparing news releases and producing a clear and concise synthesis of events surrounding the RAP. This person could be hired or contracted on a part-time basis (1/2 person year) or could be a permanent employee with responsibility for similar activities in another RAP. The anticipated resources would in either case amount to approximately \$25,000.

Other costs would include graphic design, typesetting, printing and mailing and other distribution costs. A projected annual budget is provided below:

1. Annual Report: \$20,000 for development and production (printing to be determined)
2. Newsletter: \$6,000 for production; \$15,000 for printing
3. General: news releases, etc. \$5,000

The total cost of this program would therefore be approximately \$ 75,000. It is assumed that funding responsibility would continue to rest with the Environment Ontario. It is further assumed that general public information initiatives would be continued by the province and that PAC operations would be maintained.

#### Program Benefits

The benefits of a RAP/Communications plan include:

- o expanding public awareness about the results of implementing the Metro Toronto RAP;
- o promoting public interest in water quality and RAP issues; and
- o keeping the RAP visible and making it accessible.

The RAP communications plan will allow dissemination of progress of remedial efforts within the context of the ecosystem approach. Reliance on non-RAP communications vehicles

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would likely lead to piecemeal reporting which could be detrimental to long-term implementation of RAP projects. The communication plan would seek to prevent this.

### Dependent Projects

None of the Component Actions listed in this document are directly dependent on the communications plan. Effective communication of progress within the ecosystem context will be necessary, if long-term support for the many programs is to be maintained.

### Monitoring Requirements

Not applicable.

### Reporting

The annual report should report progress on an individual Component Action basis and also should provide an integrated overview of progress towards remediation. In addition, the report should provide information on the progress made by individual agencies and jurisdictions in meeting their commitments.

### Implementation

Implementation of the communications plan would be coordinated through the Communications Branch of Environment Ontario. Implementation of the plan would begin after completion of the Draft RAP and the securing of commitments. The annual report should be targeted for September of each year to allow time for reporting by the agencies following their fiscal year-end and to provide for the widest possible audience.

### Potential Delays

No delays are anticipated once funding is approved and the program is initiated. The first annual report will be produced in the year following commitment of the jurisdictions to the plan. Delays in negotiating commitments could effect the scope of the annual report in the first year.

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### Summary Information for Implementation

Component Action:	RAP Communications Plan
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	none
Implementation Responsibility:	province
Funding Responsibility:	province
Additional Costs Range:	\$ 75 K/year
Monitoring Requirements	none
Reporting Requirements:	overview of progress program progress agency progress
Timeframe:	1 year after commitments established
Potential for Delay	low
Potential Reasons for Delay	negotiation of agency commitments

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### COMPONENT ACTION # 5.1.2:

#### Establish a RAP Library to Encourage Public Research into Environmental Issues

The Metro Toronto area has received extensive study for many years through the individual initiatives of various agencies and public groups, as well as the combined efforts of groups of agencies under programs such as TAWMS and RAP. A large body of information exists, but it is often difficult to access.

It is expected that RAP implementation not only will generate actions by responsible agencies, but also a continually growing involvement by the public in the programs and projects. Demand for information is expected to increase. There is a need to provide a facility which will:

catalogue and house the large amount of public information materials and reports about water quality related or general environmental issues;

provide a central clearing house for these materials;

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provide an evaluation of the usefulness and effectiveness of the information as it may relate to the RAPs goal of cleaning up and protecting water quality in Metro Toronto.

### Existing Programs

Numerous libraries operated by municipalities, universities, provincial agencies, and public interest groups, already exist. Many of these facilities contain the published reports relevant to the Metro Toronto RAP and most are on the RAP mailing list, as well as the mailing list of other government agencies (such as the IJC) and public groups such as the Centre for the Great Lakes and Great Lakes United. The provision of information materials by these facilities is of course, part of a general service and is not specifically oriented to Metro Toronto RAP concerns.

In addition to permanent library facilities, temporary information centres are often established as part of the public consultation program for projects undergoing class or full Environmental Assessment (EA). Access to the information is advertised as a part of the EA process, but the information available is limited to that which is pertinent to the undertaking.

Some efforts have been made to establish library facilities which are oriented to the specific environmental and water quality issues in Toronto. The Metro Toronto RAP contracted the development of a bibliography for reports which were used in the development of the Stage 1 report (Environmental Conditions and Problem Definition) and did assemble the majority of these references at Central Region of Environment Ontario. The success of this initiative was limited because a lack of trained staff, inadequate facilities for storage and copying, insufficient staff to administer the resource centre. The Royal Commission on the Future of the Waterfront went further, establishing a resource library with dedicated staff. The Royal Commission library is not specifically oriented to RAP issues, but contains many reports relevant to the RAP as well as other issues of concern across the Toronto waterfront.

### Potential Improvements

The establishment of a library or resource centre would increase access to information for citizens, public groups, and researchers. It is expected that the library would be a central clearing house for all relevant public information materials. A board would be established to review the materials and provide an evaluation of the usefulness to RAP implementation.

The roles of the facility would be twofold. Operating as the RAP library, it would act as a centralized research facility for students, researchers, or members of the public. The research conducted would be of general benefit for its self-education value, but would be expected to provide direct benefits as well by assisting public groups seeking to promote and undertake specific projects within the context of the RAP (see Component Actions # 5.2.1 and 5.4.2). As a clearing house, the centre would: search out, receive and review published information on environmental and water quality issues (particularly of the "what can I do" kind); provide ideas for public projects that could be funded through the RAP Grants Foundation (see

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Component Action # 5.2.1); and provide the public with RAP related information materials at one location.

There are many possible options for the establishment of a RAP oriented library facility. Two possible options are presented below. Both are only concepts and refinement is expected as a result of discussions during the option selection phase of the RAP.

### **A. Establish a Metro Toronto RAP Library**

This option would involve establishing a facility specific to RAP related materials and issues. A resource person/librarian would be required to send away for materials, sort through and catalogue information, organize the review committee, maintain the library and keep any mailing lists (\$40 K/year). Space for the housing of resource information and a public reading area would be required. For a stand-alone RAP facility, space would have to be rented (anticipated cost: \$50 K/year).

An additional annual operating budget would include:

Printing and mailing - \$5,000  
Acquisitions - \$5,000  
Communications (brochure, etc.) \$10,000

The total anticipated cost for this option would therefore be \$110 K per year. It is assumed that costs would be the responsibility of Environment Ontario and possibly Environment Canada.

### **B. Establish a RAP Resource Centre in Conjunction with an Existing Facility**

This option would involve "piggy-backing" the storage and research facilities onto an existing facility. Possible facilities include Environment Ontario's public information centre, the Royal Commission on the Future of the Toronto Waterfront library, or a central public library facility. The expected future of the Royal Commission's library (after June 1991) and space availability at the other facilities would have to be determined. For the purposes of this discussion, it has been assumed that the space would be donated.

Staff and operating budgets would be the same for this option as those indicated in A. The emphasis would be altered slightly with staff efforts being directed entirely at dissemination of public information, with research assistance being provided by staff at the selected facility. The anticipated cost of this option is therefore \$ 60 K/year, borne by Environment Ontario, Environment Canada and possibly other implementing agencies.

### **Potential Benefits**

The benefits of the library would include: housing relevant water quality publications at one location; providing new ideas for projects funded through the proposed RAP Grants

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Foundation (see Component Action 5.2.1); providing a good resource base of information for members of the general public; promoting more public awareness and possibly more active public involvement in the Metro RAP by allowing individuals the means to identify ways in which they can support the goals of the RAP.

### Dependent Projects

None of the other options discussed in this paper under the various component actions are directly dependent upon the creation of a RAP library facility. Potential linkages exist with many of the other component actions described in the section and under Remedial Intent # 6.

### Monitoring

None Required.

### Reporting

Reporting of library activities and usage should be included in the RAP annual report.

### Implementation

Where the information will come from, where it will be stored and who will be represented on the review committee must be determined. A resource person/librarian also must be hired. Another important component of the implementation is a communications plan to promote the library, explaining what it is, how it works and how it can be used.

### Potential Delays

Delays would be expected to be minor once funding approval is provided. Establishing a fully operational facility could be completed within a year.

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### Summary Information for Implementation

Component Action:	RAP Library
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Communications Plan RAP Grant Foundation Public Improvement Programs Public Awareness - Other RAPs
Implementation Responsibility:	province/potential federal
Funding Responsibility:	province/potential federal
Additional Costs Range:	\$ 60 - 110 K/year
Monitoring Requirements	none
Reporting Requirements:	RAP annual report
Timeframe:	1 year after commitments established
Potential for Delay	low
Potential Reasons for Delay	collection of materials, hiring staff

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### REMEDIAL ACTION # 5.2:

Establish a Means of Providing Support to NGOs  
and Municipalities For Projects Which Encourage  
Public Involvement

One of the basic elements of the remedial action plan approach is that it is a cooperative effort involving all levels of government, business, industry, and the public. During the RAP development phase, the participation of public and private organizations has been largely consultative. As the RAP moves into implementation, it is expected that this will change, with non-government groups becoming involved in specific projects.

Various levels of government provide funding programs and grants to non-government organizations (NGOs). Private foundations also provide funds to groups undertaking environmental projects. The funding is not integrated but there often is a "matching funds" requirement, either implicitly or explicitly stated in the approval process. Most funding programs are aimed at broad objectives and they do not therefore specifically promote projects which would be beneficial to the RAP.

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Creation of a foundation to administer grants would allow greater mobilization of community resources during the implementation of the RAP. Projects funded through the foundation would be expected to be largely publicly initiated and would comprise a significant voluntary component. By encouraging a sense of ownership in specific projects, greater public awareness of their ability to effect the environment would be promoted.

In addition to public initiatives, the foundation could be used to fund municipal or conservation authority programs which would "go a step beyond". Many programs produce environmental benefits which are either difficult to quantify and compare to costs, or are relatively expensive for the environmental benefit derived. As a result, expansion of existing programs may be difficult to justify based on environmental benefits alone. They have additional characteristics however, of either providing an opportunity for direct public involvement or increasing people's awareness of their impact on the environment. A supplementary source of funding of these programs could allow their expansion in order to involve larger segments of the public. The expenditure of funds would be justified in equal measure by environmental improvement and attitude improvement. Examples of these types of programs include:

- o Household Hazardous Waste Collection
- o Aesthetic Clean-up (such as SCOUR)
- o Rehabilitation projects (e.g. tree planting, stream maintenance)

### COMPONENT ACTION # 5.2.1:

#### Establish a Foundation to Fund Local Initiatives

Presently there is: a diverse set of environmental programs which are funded by numerous agencies/groups; no integrated assessment of program effectiveness; no centralized funding or planning of public initiated programs relevant to RAP implementation; and no linking or continuity among existing programs.

A foundation to fund local initiatives under the RAP would bring a centralized decision making capability to the funding of NGO and citizen-sponsored projects. Coordination of projects in geographically separated areas would further the ecosystem goals of the RAP and would foster greater public involvement across the RAP watersheds and lakefront. The foundation would provide a means of distributing monies generated by innovative funding initiatives, undertaken by government agencies or public organizations. By incorporating fund raising into the responsibilities of the foundation, an opportunity would be provided to the public to directly influence the rate at which environmental initiatives progress.

#### Existing Programs

Although there are numerous grant and subsidy programs operated by government agencies and public foundations, there are none which are specific to the Metro Toronto RAP. It is anticipated that existing programs would continue. The foundation would become a potential

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source of "matching funds" and would indicate the governing board's and the RAP's support of the project within the RAP framework.

### Potential Improvements

A single option is described below. Since it is intended that the foundation would require substantial public input, the option is stated in conceptual terms only, with some speculation as to baseline resources. Discussion during the option selection phase of the RAP is expected to allow refinement of the option.

#### **A. Foundation for Grants**

The proposed Foundation for Grants would be an arms-length organization with board membership from RAP implementers and the public. The foundation would receive and review requests for grants for projects that support the goal of restoring and protecting Metro Toronto's water quality and the actions being undertaken under the remedial action plan. The foundation would also be responsible for: raising and allocating funds; defining guidelines/requirements for applicants; auditing programs and assessing projects; and meeting once a year to allocate funds.

Details of the operation and terms of reference for the foundation would be established by prospective board representatives. The kinds of projects to be funded could include:

- o remedial projects sponsored by NGOs
- o basic operating budgets for newly established NGOs dedicated to environmental cleanup
- o subsidy to groups operating "hands on" programs with a major volunteer component
- o enhanced subsidy to agency projects (especially to encourage multi-use facilities)
- o enhanced subsidy to programs with a high public awareness value

In order to facilitate day-to-day operation of the foundation a contracted Executive Director (\$45-50,000 per annum) would be required. This person would be responsible for the daily operation of the foundation, including the provision of secretariat services, receiving and processing grant requests, conducting audits of projects, administering foundation budget, and communicating the role and work of the foundation to the public.

A foundation operating budget would be required. It is anticipated that the basic budget would be provided by the RAP implementing agencies. If it is assumed that each municipality contributes \$5000 and the conservation authority, province and federal government contribute \$25,000 each, then an operating budget in the order of \$ 150,000/year would be available. The magnitude of the foundation's budget beyond this would be dependent upon the success of fund raising programs and the availability of innovative funding from such sources as affiliated credit cards or lottery funds. The RAP program has initiated a study of alternate funding sources which will examine, among other mechanisms, the feasibility of different innovative approaches (see Component Action #7.1.5).

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### Potential Benefits

The benefits of the formation of a foundation for grants would include: centralized RAP related project funding; RAP activities and public activities to be coordinated in such a manner as to support each other; easier public access to grant money.

The overriding benefit of this option would be an increase in the ability to mobilize public involvement in the remedial efforts of the RAP. In addition to the benefits accruing as a result of the projects undertaken, greater involvement is expected to increase public awareness of environmental problems and support for RAP initiatives.

### Dependent Projects

None of the component actions cited in this paper are dependent upon the creation of a foundation for grants. A number of actions are closely related however, and would benefit from the establishment of the foundation. There would likely be an opportunity for linkages between the foundation and the communications plan (# 5.1.1) and the library (# 5.1.2). In addition, operation of the foundation would be expected to facilitate assistance to voluntary NGO programs (# 5.3.2) and encouraging NGO improvement programs (# 5.4.2).

### Monitoring

No ambient monitoring is required for this option.

### Reporting

Details of the auditing of the foundation would be established as a part of the discussions leading to its creation. In addition to these requirements the activities of the foundation should be described in the RAP's annual report. The RAP communication plan would be used as the vehicle for providing news releases regarding foundation activities and the activities of groups conducting projects with foundation support.

### Implementation

The means of setting up a foundation needs to be further researched. It is expected that discussions surrounding establishment of the foundation could begin after an indication of whether support could be expected from the implementing agencies. Whether the implementing agencies should provide funds every year or only during the early years of setting up the foundation must be discussed. Alternate sources of funding to supplement the implementors contributions would have to be investigated. The funding mechanisms study (# 7.1.5) is to be completed by the Fall of 1990 and should provide useful information on innovative funding options.

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### Potential Delays

The concept of an arms-length RAP foundation is new and would require extensive consultation between all parties involved. Although the concept is being investigated as a generic idea available to all Ontario RAPs, it is in its formative stages and it is expected that the actual establishment of a foundation, if selected as an option, might require two years.

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### Summary Information for Implementation

Component Action:	Foundation for Grants
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Communications Plan RAP Library Public Improvement Programs
Implementation Responsibility:	all implementing agencies; public
Funding Responsibility:	all implementing agencies; additional funding mechanisms to be determined
Additional Costs Range:	\$ 5 K/year - municipalities \$ 25 K/year - federal/provincial/conservation authority
Monitoring Requirements	none
Reporting Requirements:	RAP annual report; news releases
Timeframe:	2 years after commitments established
Potential for Delay	medium
Potential Reasons for Delay	new concept

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### REMEDIAL ACTION # 5.3:

Encourage Public Use of the Waterfront and  
Valleys and Increase Public Involvement in  
Aesthetic Clean-up Programs

In the discussions which led to the establishment of the RAP goals by the public advisory committee, there was a strong theme which pointed to the desire to get the public in touch with the resources provided by the RAP area's network of river valleys and the waterfront. This was seen as an important element for promoting an ecosystem awareness and in developing public support for clean-up programs.

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One difficulty involved in public use of the river valleys and the waterfront is the degraded visual environment caused by the accumulation of litter and garbage from various sources. The degraded aesthetics diminish the public's enjoyment of the resource. The presence of trash may promote a disregard for the value of natural areas, leading to more littering and a worsening of the problem. The converse also is true. Staff involved in clean-up programs in the Toronto area have observed that once cleaned up, many areas tend to remain cleaner for longer periods of time. Public use and care for the river valleys and waterfront is enhanced by aesthetic clean-up programs.

Clean-up programs are conducted by various agencies and organizations. Open space in parks is maintained by municipal staff. River and streambank clean-up is coordinated under the SCOUR program, administered by the conservation authority. Increasing numbers of interest groups and community organizations organize intermittent clean-up days. The Toronto Field Naturalists and Friends of the Don are two good examples of groups which annually hold clean-up weekends on portions of the Don River. Other community-based initiatives have also resulted in aesthetic improvements in other streams within the RAP boundaries. These groups utilize volunteers and are usually successful in soliciting corporate support from large waste management firms to assist in disposal of the debris.

Each of these types of programs have the merit of improving the aesthetics of the open space areas within the RAP area. The SCOUR program has the additional benefit of increasing public awareness through the publicity generated. The publicly organized events promote community involvement and an awareness of the value of the resource.

### COMPONENT ACTION # 5.3.1:

### Continue Established Clean-Up Programs Such as SCOUR

For the purposes of this discussion paper, "Clean-Up Programs" refer primarily to stream clean-up initiatives. The main responsibility for aesthetic clean-up efforts lies with local municipalities. Most of these efforts, however, are directed at residential and park clean-ups with very minimal attention directed at removal of debris from the stream banks or the watercourse itself. Most streams in the RAP watershed display some degree of aesthetic impairment from man-made debris. While some refuse is intentionally thrown or dumped into local watercourses, a significant amount blows from residential or industrial areas or shrubs growing near the stream. Another source of in-stream debris is the washing off of garbage from construction sites and other table-land areas during storms.

While stream clean-up initiatives can only provide a cosmetic benefit to the watercourse, these kinds of clean-up efforts are valuable in fostering improved awareness of stream health and greater pride in the appearance of local streams. Of equal benefit are the experience and educational opportunities provided to the youths participating in the program, some of whom, may be pursuing careers in the environmental field.

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### Existing Programs

There is not currently any one agency charged with the responsibility of undertaking aesthetic improvements of stream channels. The discussions which follow summarize the efforts of the Conservation Authority and the Environment Ontario in undertaking stream clean-up initiatives. The results of these efforts are largely due to individual staff who rearrange other priority projects to "fit" this in.

Since 1985 the only organized agency efforts directed specifically at stream clean-up has been a joint venture between The Metropolitan Toronto and Region Conservation Authority (MTRCA), and the Ministry of the Environment (MOE), and, more recently, the MTRCA and the Ministry of Skills Development. The amount of funding utilized for clean-up efforts in the past five years is as follows:

<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
\$150,000	\$115,000	\$130,000	\$129,000	\$40,000

In 1985, the Central Region office of the MOE developed a summer youth program entitled SCOUR (Student Cleaning Our Urban Rivers) which was implemented in cooperation with the Conservation Authority. Each summer since that time, the Conservation Authority, has participated in a youth stream clean-up program primarily aimed at removing man-made, non-hazardous wastes from streams and valleys in the Metro area. In addition to stream clean-up, the program is designed to include spills monitoring, problem sewer discharges, and general surveillance of stream health. The MOE sponsored program was in effect for three years, from 1985 to 1987. During that time, an average of 25 - 30 youths were hired each summer between the ages of 15 and 24.

In 1988, the Ministry of Skills Development with the sponsorship of five other Ministries (Environment, Natural Resources, Tourism and Recreation, Agriculture and Food, and Northern Development and Mines), established the Environmental Youth Corps Program. This is now the vehicle by which youth clean-up projects have operated during 1988 and 1989, and for the foreseeable future. This program is designed to hire youths between the ages of 15-24 in environmental or ecology related projects.

A summary of watercourses cleaned and debris collected is presented in below for the period 1985-89.

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Garbage Collected	70,428 kg	39,740 kg	102,427 kg	88,787 kg	6,000 kg
Total Distance Cleaned	114.2 km	34.6 km	46.6 km	100 km	21.5 km

Under the EYC Program, the Conservation Authority or other sponsoring, non-government agency must be prepared to make staff time available to assist in coordination of these projects and must be prepared to contribute funding to cover expenses. A summer clean-up

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program, as has been operated in the past, is not self-supporting because of the relatively major expenses required for rental vehicles, safety equipment, etc. Under the current funding arrangements of the Environmental Youth Corps Program, direct operating expenses are subsidized to a maximum of 5% of the total project budget. For example, a clean-up project with a budget of \$40,000 would receive only \$2,000 in expense monies. An example of typical expenses incurred in operating such a program are provided below:

- Vehicle Rental (Vans):      \$700/van/6 students
- Gas:                                variable, but averaging \$200/month
- Safety Clothing  
(work boots, waders,  
rubber gloves):                \$70/person
- Equipment (shovels, etc.):    \$100
- Refuse Disposal:                Approximately \$3-4/100 kg.; therefore \$1200-2400.

The program provides for the hiring of a "Project Coordinator" whose job it is to implement the project within the organization in question - for example, the Conservation Authority. Although, in theory, the concept is sound, in practice, the input required on the part of full-time agency staff can be significant in the early stages of the project.

During the first three years, activities tended to be concentrated on the more urbanized streams within Metropolitan Toronto, however, in recent summers, greater attention has been placed on the central and headwater portions of the major river systems within the RAP watershed. These include tributaries of the Humber River (Black Creek) and the Don River (German Mills Creek).

Two approaches have been used in coordinating the stream clean-up efforts of the past five years. In the early years a section of watercourse was selected and the crews would begin moving upstream, kilometre by kilometre. The alternative approach is to target specific smaller reaches on a number of watercourses, attempting to satisfy the objectives of the project while achieving a maximum of public exposure. This approach was used during 1988 and 1989. The primary benefit of this method is the greater number of opportunities to increase public awareness of the problems of in-stream debris. It was found that local media within each municipality were usually eager to profile the student efforts and provided a good forum for explaining the magnitude of the problems.

These summer programs have been effective at meeting the stated objectives of stream clean-up, although there are few established targets by which to gauge the success of the program. The majority of the major watercourses within the RAP area have been cleaned at least once. The degree of coverage in any given year is clearly dependent upon the number of students hired. Students who have worked on this program during the past two summers suggest that this program is having some positive effect, since some watercourses which have required repeated cleanings are now remaining clean.

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The publicity generated from this program was generally not adequate during the first three years. It is important that press coverage include not only the major print and electronic media, but also the local media within municipalities. During the past two summers, greater effort was expended in issuing weekly news releases to insure maximum coverage. During the summer of 1989, this process worked effectively.

### Potential Program Improvements

Although, as previously discussed, the program has essentially met the stated objectives of stream clean-up, there are a number of issues which should be addressed if the program is going to continue in future years. Two alternatives exist: Improve the existing program; or establish a separately funded program similar to the EYC program.

#### **A. Improve Existing Program**

Two potential improvements to the program are suggested.

1. Generate greater input from the public regarding problem sites.

Since a major focus of stream clean-up efforts is to generate a positive reaction from the general public, the public's input would be valuable. This could be accomplished by improved advertising of the program early in the summer and would require a staff person to respond to inquiries and determine the clean-up effort needed. The additional promotion of the program could probably be accomplished utilizing existing resources at the Conservation Authority. The most significant change would be the additional management required to properly handle the requests from the community. No significant costs would be associated with this improvement.

2. Hire staff in May to evaluate/assess problem areas.

As the current clean-up program operates, staff are not usually hired until late June or early July, and little opportunity exists to thoroughly determine where significant clean-up efforts are needed. It is useful to target a number of clean-up areas prior to the hiring of summer students and thereby maximize the clean-up efforts in July and August. This has not occurred in past years is a combination of low wages, and an inability to hire youths until late June. The successful implementation of this program is largely the result of staff who "make time" to deal with this among their other duties. This tends to result in somewhat less attention being paid to the organization of the program early in the season, ie. - April and May. This could change if greater emphasis was placed on this program by all parties concerned including the Conservation Authority and the general public. No significant additional cost is expected as a result of this possible improvement.

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### **B. Implement a Separately Funded New Program**

It should be stated that while some deficiencies exist in the (EYC) funding arrangements, the stream clean-up initiatives would not be possible at all without the support of a program like the EYC. There are problems with the EYC program however which may limit its future viability. Principle among these are the problems of wage scale and expenses. In addition, since stream clean-up is not considered a responsibility by any agency, the project, as it had operated in years past, is very susceptible to staff turnover and changes in program priorities.

If stream clean-up is considered an important activity in the watersheds of the Metropolitan Toronto and surrounding areas, it should be recognized as such in setting appropriate wages. In the Metro area, minimum wages and slightly greater are generally not adequate to attract and keep students for a two or three month period. For this reason, and in recognition of the fact that students should receive a greater perspective of environmental problems beyond garbage collection, staff of the Conservation Authority endeavoured to educate students on water quality problems in this region during the 1989 program. These educational opportunities are vital in the success of this program from the students perspective. These young people are clearly not in this program for the money. Wages now range from minimum wage (\$5.00/hr.) to \$9.00 for the Project Coordinator. A very prominent stipulation in the EYC Program is that wages are not to be "topped up" under any circumstances. This means that the sponsoring organizations (for example the Conservation Authority) cannot add any of its "own" money to these wages to make them more competitive.

Stream clean-up should be developed into a "core" responsibility of some agency. If the whole concept of utilizing youths or summer students to make rivers and streams more aesthetically pleasing while providing them an education in environmental issues is considered important, then perhaps it should be funded as an annual program through RAP. One agency should be given the responsibility of implementing the program each year with adequate funds to ensure these efforts achieve their maximum potential. This program could be called the "Clean River Program" and might possibly be coordinated by the Conservation Authority since it has been involved for several years.

This program would likely remain as a seasonal initiative, running from late spring until September. Approximately \$100,000 would likely be needed annually to hire about 20 youths as well as a Project Coordinator. Assuming the program would be operated by MTRCA and would receive the typical provincial/municipal cost sharing, this would result in an annual cost to the province of \$55K and an increase in municipal levies of \$45K/annum.

#### Potential Program Benefits

The benefits of the existing program are the physical clean-up of stream areas, which would otherwise be neglected and the increase in public awareness which is attendant to the program. These benefits would also accrue to any improved program. The primary purpose of the improvements suggested is to make this type of program more permanent and less subject to year to year variability in the operating capability of sponsoring agencies.

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### Dependent Projects

This program is not dependent on any other program, other than for competition of funding resources.

### Monitoring Requirements

There are no major monitoring efforts required to assess this program. Of greatest benefit, perhaps, would be to revisit streams cleared in previous years.

### Reporting Requirements

The reporting requirements are already in place. Annual reports are produced by the Project Coordinators documenting the streams cleaned, the amount of debris collected/kilometre, the type of debris, and the amount recycled.

### Implementation

Each of the program improvements identified in the previous section are intended to ensure that stream clean-up programs continue in the Greater Metro region and become incorporated into annual budgeting and programming of a government or non-government organization. Of greatest importance over the short-term are efforts which will maximize public exposure of the program. In the long-term, however, increased funding and discussions of appropriate office space will be of greatest importance in developing a viable program.

Implementation of the second suggested improvement is dependent upon the funding being available over and above existing EYC Program. A logical agency to implement these improvements might be the Conservation Authority since they have been involved in this program since its inception in 1985.

### Potential Delays

It is not likely that the EYC Program will make any exceptions to its provincial policies simply to accommodate the desire to implement stream clean-ups in the Metro area. The most significant potential delay would therefore likely involve the allocation of funding to replace the existing EYC Program. At present funds are provided through EYC and are drawn from any particular agency's budget.

Since 1990 budgets are already set for government agencies, the earliest that changes could occur would be for the summer of 1991.

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### Summary Information for Implementation

Component Action:	Government Stream Clean-up (SCOUR)
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Non Government Clean-up Programs
Implementation Responsibility:	MTRCA
Funding Responsibility:	province/municipalities
Additional Costs Range:	Province: \$ 55K/year Municipalities: \$ 45K/year
Monitoring Requirements	Revisit previously cleaned sites
Reporting Requirements:	As per existing program
Timeframe:	immediate
Potential for Delay	medium
Potential Reasons for Delay	funding

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### COMPONENT ACTION # 5.3.2:

Provide Assistance to Voluntary Programs  
Conducted by NGOs

Many community groups and public interest groups conduct clean-up days, often combined with interpretive walks or other activities. These events physically improve the river valleys but also have the added benefit of increasing people's awareness of the value of these resources. Such events should be encouraged by the RAP wherever possible. Preliminary efforts have been made to determine the form that assistance might take. There is a need for more extensive investigation of this option however and more input is needed from the public groups which might utilize any assistance. Discussion of the options paper will provide a forum for suggestions which will allow development of options at a future time.

### REMEDIAL ACTION # 5.4:

Implement Stream Improvement and  
Rehabilitation Projects Which Will  
Encourage Greater Public Pride in Their  
Rivers and Waterfront

The streams and rivers of the six watersheds within the Metro Toronto RAP area are a major resource. Both technical staff from agencies and the public have repeatedly stressed the importance of rivers when managing the ecosystem within the RAP area. The Public

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Advisory Committee has been conscious of this in establishing the RAP goals. Many of the goals are explicit in referring to both the waterfront and watersheds. Goals have been established which call for protection and creation of wetlands and aquatic habitats.

Stream improvement, rehabilitation, habitat creation are all related primarily to the fishery, although they will also produce benefits in aesthetics and sediment reduction. While sportsmen place a high value on the fishery for its' angling opportunities, the general public is no less supportive of the need for stream improvement to enhance the fishery. For the general public, the fishery is a symbol of the quality of the ecosystem. In order to demonstrate progress towards restoration after implementation of the RAP, it will be necessary to document improvements in the fishery. It will not be possible to do this by focusing on headwater areas alone, nor on put-and-take fisheries. The creation of a self-sustaining urban fishery will be required to demonstrate improvements.

All of Toronto's watersheds have been degraded through development. Conversion of the forest first to agriculture, and then to an urban environment, has led to increases in temperature, in-stream erosion, sediment production and chemical contamination. The riverine fishery is most severely impacted on a continuing basis by changes in physical habitat and non-toxic water quality problems such as temperature and suspended sediment. Intermittent releases of toxic substances, as a result of poor handling and release of industrial and domestic chemicals to storm sewers, and spills, have a severe, but short-lived, effect on the fishery. Urban runoff, with its high concentrations of heavy metals, represents a significant, but intermittent, stress on the riverine fishery. Urban runoff frequently leads to you of the PWQO.

Many of the remedial measures in this discussion paper focus on the need to improve water quality through the reduction of contaminant sources. In many cases however, improvements in water chemistry will be insufficient to allow improvement in the fishery because deficiencies in habitat. Stream improvement to enhance habitat must be undertaken in parallel with contaminant source reduction if measurable improvements in the fishery are to be achieved.

Stream improvement projects are carried out primarily by the Conservation Authority or the Ministry of Natural Resources. MTRCA programs are done in conjunction with municipalities, and in some cases private land owners. MNR programs are often conducted under the Community Fisheries Improvement Program and involve public groups in the rehabilitation efforts. The agency sponsored programs are discussed under Component Action # 5.4.1. In recent years organized public interest groups have become active in promoting stream improvement projects. The participation of public groups in stream improvement and possible options to support these initiatives are discussed under Component Action # 5.4.2.

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### COMPONENT ACTION # 5.4.1:

### Continue Government Stream Improvement Programs

Stream improvement programs refer to those initiatives in the RAP watershed which are directed at controlling sediment generation from overland and stream bank sources, and improving fisheries and wildlife habitat. The goal of reducing sediment generation is primarily achieved by erecting cattle fencing and building controlled livestock access areas to limit sediment produced in agricultural areas, and by undertaking stream bank stabilization projects to correct areas of severely eroding banks. Using estimates from the Lake Erie basin, streambank erosion may contribute up to 30% of the sediment reaching Lake Ontario. In addition to sediment control as a part of stream improvement programs, other programs are operated to reduce large scale erosion (causing a hazard to life and property) and sediment generation occurring from construction activities. These are discussed in Component Actions 4.1.3 and 4.1.4 under Remedial Intent #4.

Sediment loading to watercourses is a concern throughout the Metro RAP watershed. Historically, sediment loads increased dramatically throughout the entire watershed in the 1800's as vast forest tracts were cleared for agricultural purposes. In the headwater, and middle-valley portions of the Humber, Don and Rouge Rivers, sediment inputs are still associated with agricultural activities and streambank erosion, as well as runoff from the numerous small urban communities.

Increased sediment loads can change the substrate of a stream, increase turbidity and the level of toxic substances, clog fish gills, and interfere with fish movement. The control of sediment inputs to watercourses and the resultant benefits to water quality is a primary objective of stream improvement projects.

Stream improvement programs are not limited to sediment control alone. There are also projects aimed at improving the fisheries habitat available in streams.

#### Existing Programs

Stream improvement initiatives are primarily undertaken by The Metropolitan Toronto and Region Conservation Authority and the district office of the Ministry of Natural Resources. MTRCA programs focus on sediment control although other forms of stream rehabilitation are undertaken. Those conducted by MNR are oriented towards stream rehabilitation.

#### **MTRCA Programs**

The Conservation Authority has traditionally been involved in implementing stream improvement from the perspective of controlling sediment inputs to the watercourse, as opposed to fisheries rehabilitation measures. Since 1979 however, the Authority has been focusing attention on priority fisheries management zones. The reduction of sediment generation through stabilization projects has benefits in improving fisheries habitat.

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Sediment control projects within the RAP watershed are conducted by the MTRCA under its Conservation Land Management (CLM) Program. The Authority's CLM program was initiated in 1980, although the goal of constructing sediment control works has been ongoing since 1962. Since the early 1960's, over 125 stream improvement projects have been implemented within the RAP watershed.

Works conducted under the CLM program differ from those completed under the Erosion Control Program (Component Action # 4.1.4) primarily in terms of scale and construction techniques. The Erosion Control Program deals with large sites where there is a hazard potential and typically require more extensive construction (project costs are typically in the hundreds of thousands). Projects conducted under the CLM program are usually much smaller (typically in the tens of thousands) and do not require as intense construction activity.

The following table provides details on the projects completed between 1983 - 1986. Under the broad mandate of the CLM Program, attention is focused on a variety of management concerns including on and off-stream erosion and sediment control, fish and wildlife habitat improvement, and aesthetics.

### **SUMMARY OF STREAM IMPROVEMENT PROJECTS 1983-1986**

Type of Stream Improvement	Humber River	Rouge River	Don River	Etobicoke Creek	Cumulative Total from 1962-1986
Bank Stabilization (meters)	280	0	0	0	14,260
Fencing (meters)	2,545	0	0	0	11,046
Buffer Planting (meters)	2,735	100	100	1000	15,977
Log cover structures (projects)	119	0	0	0	350
Fishing Trails (meters)	8,560	0	0	0	11,160
Deflectors (projects)					62 (Humber)

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The vast majority of sediment control projects have been directed at streambank stabilization initiatives. Approximately 50% of the stream improvement projects completed in the last 10 years have been log crib or rip-rap works to stabilize eroding or slumping banks. Buffer plantings consisting of trees and shrubs are also done, but on a much smaller scale. Sediment control, consisting solely of buffer plantings, are rare; in most instances, the buffer plantings are the final step in completing a stabilization project.

Funding for stabilization projects is cost-shared. The Conservation Authority is allocated annual funding by the MNR which is contingent on matching funds being provided by a municipality. This arrangement is consistent with the CA's partnership role with the Province and local government. The amount of provincial funding has steadily decreased during the last 10 years. Fifty thousand dollars was allocated for sediment control in 1989 and was matched by member municipalities. The majority of projects were undertaken in cooperation with municipalities, with the municipalities contributing 50% of the project costs. The Authority will undertake work above regular budget allocation if the municipality is prepared to fund the entire project. Over the past decade, projects have been completed in Markham, Brampton, Richmond Hill and Caledon, however, the majority of work has occurred in Brampton and Markham. Private landowners are also eligible to apply for improvement projects. Private landowners, however, are also requested to contribute a minimum of 50% of the project cost depending on priority of the site.

The effectiveness of the Authority's sediment control initiatives is difficult to quantify. From the perspective of sediment generation, there are no data available (such as water samples collected upstream and downstream) to indicate that sediment inputs are substantially lower after completion of the project. Even if the appropriate resources of staff and sampling allocation were available, the ability to measure water quality improvement on a site-specific basis is doubtful. Qualitatively, however, it is clear that significant reductions in localized sediment generation results from these stabilization projects.

From the perspective of meeting its program objectives, the sediment control component of the CLM Program is performing as intended, although on a much smaller scale than is desired. The Authority funding directed to this program ranges up to \$50,000 annually. When these projects are completed in co-operation with a municipality, the funds are matched, thereby doubling the available funds. In "project dollars" then, the Authority has completed \$600,000 dollars of sediment control projects over the last six years, by working with municipalities. Although this program is also available to private landowners, the contribution of 50% of the project cost makes this an unappealing proposition. For this reason, Conservation Authority staff, during the 1980's, have tended to focus marketing efforts on the municipalities.

The majority of work over the past several years has been completed in Markham and Brampton because constraints on staff resources do not permit Authority staff to promote the program pro-actively to member municipalities. From the perspective of controlling sediment inputs, this means that projects are not necessarily completed on a priority basis across the RAP watershed. The addition of staff to allow a more aggressive marketing campaign would

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not necessarily have the desired effect unless matched by a budget allocation sufficient to undertake additional new projects. A negative impression could be created if substantial new interest is generated but projects cannot be completed of a lack of project funds.

### **Ministry of Natural Resources Programs**

The district office of the Ministry of Natural Resources also plays a significant role in stream improvement within the RAP boundaries. In 1989, MNR conducted stream inventories utilizing students hired under the Environmental Youth Corps program. These activities are coordinated by a Fisheries Rehabilitation Biologist who is responsible for rehabilitation initiatives on rivers and streams within the Maple district. The Maple district boundaries extend far beyond those of the RAP, encompassing the Credit River on the west, the Pickering townline to the east, and portions of Lake Simcoe in the north. MNR pursues most of its rehabilitation projects by utilizing the Community Fisheries Involvement Program (CFIP). Under this program, MNR provides direction and coordination to local angler groups (such as Trout Unlimited) who actually undertake the implementation of remedial measures. Typical projects under this program include log cribs, brush bundle stabilization, or shrub plantings.

The terms and conditions of the CFIP limit rehabilitation efforts to those watercourses where community groups show strong support and are willing to commit volunteer time. This has resulted in the majority of these projects occurring on the Credit River and other watersheds outside the RAP boundaries. The program offers an excellent opportunity for community involvement, but is most effective in areas with a valued fishery. It is less effective in urban streams where existing impairment reduces the prospect of rapid improvement.

Priority stretches of stream are worked on with the active participation of a Conservation Authority, community group or anglers association, with priority being given to fish habitat rehabilitation. Existing staff and funding resources do not permit the MNR to undertake projects of their own accord. This tends to limit work conducted on urban streams within much of the RAP area.

### **The Don River**

In September of 1989, the TAWMS Steering Committee released the Strategy for Improvement of Don River Water Quality. The strategy requires further consultation leading to the selection of options and has been incorporated into the RAP option selection process. In effort to achieve some of the immediate actions recommended in the strategy however, Environment Ontario provided \$ 185 K to the Conservation Authority in 1989.

These funds were for tree and shrub planting, streambank stabilization, and the dedication of the Charles Sauriol Conservation Reserve (a 185 hectare parcel of land on the East Don River). In total 10,500 trees and shrubs were planted and 320 m of severely eroding streambank were stabilized.

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The Environment Ontario funding was intended to maintain the impetus of the TAWMS work on the Don River. The Conservation Authority has proposed an extension to the program for 1990 at a cost of \$ 213 K.

### Potential Program Improvements

A single program improvement containing several elements, is provided below. The proposed improvement is intended to build upon the existing programs of the Conservation Authority and the Ministry of Natural Resources and is designed to promote a more proactive system of stream improvement within the RAP watershed.

#### **A. Upgrade Existing Stream Rehabilitation Programs**

Five elements are considered desirable to enhance current efforts in stream rehabilitation:

1. Prepare a comprehensive documentation and prioritization of sediment generating sites.

These efforts would entail a review of aerial photographs of the urbanizing central portions of RAP watersheds and would then be followed by in-stream walking surveys. Based upon past experience, this documentation could be accomplished over the course of one field season. This undertaking could be accomplished out of the offices of the Metro Conservation Authority or the Ministry of Natural Resources. These in-stream surveys would require two two-person teams hired on a one year contract. The costs for this staff plus vehicle and material expenses are estimated to be \$130,000.00.

2. Conduct a more comprehensive assessment of fisheries resources.

Stream inventories or fisheries surveys have been conducted in various portions of streams within the RAP jurisdiction during the last 10 years. Unfortunately, these efforts have been directly dependent upon summer staff hired under contract and under supervision by permanent staff at either the MNR or the Conservation Authority. A thorough assessment of headwater streams and watercourses in the urbanizing areas would be crucial in prioritizing the fishery resource. These efforts could be coordinated out of either the Conservation Authority or the MNR. Two staff would be required to implement this project at a cost (including materials, vehicles) of 100K/annum.

3. Market implementation efforts on a priority basis.

Once sediment generating sites are documented and ranked on a priority basis, a more aggressive marketing effort should be mounted within municipalities to ensure that projects are undertaken based upon Conservation Authority priorities. Although a biologist already on staff at the Conservation Authority could undertake the liaison responsibilities, the preparation of project proposals and planting plans is a necessity in selling these projects to the municipalities. This would require a qualified draftsman with appropriate materials and would cost approximately 50K/year.

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### 4. Provide greater funding for project implementation

If marketing efforts are successful, the base program budget will have to increase from the current level of about 50K to bring the annual budget to 100K, to be matched by municipalities.

### 5. Place greater emphasis on private landowner fisheries improvement in headwater areas.

This would require more extensive marketing of the program with individual landowners to encourage stronger support. Ideally these projects would still require some cost sharing between the Authority and the landowner. In the Authority's experience, a contribution by the landowner results in a greater appreciation for the fisheries resource being protected and may result in greater attention paid to maintenance.

This series of improvements would require and overall increase in provincial funding of \$330K in the first year and \$200K in subsequent years. Municipal funding would depend on the projects undertaken, but overall would need to increase by \$50k annually.

### Potential Program Benefits

Implementation of the proposed program improvement will have a marked benefit in directing adequate attention and resources at controlling sediment inputs and fisheries rehabilitation efforts. Perhaps the most important aspect would be to the provision of a basis for prioritization of projects to meet the goals of the RAP. The fishery is viewed as an indicator of ecosystem health as well as a resource. Improvements in water quality must be matched by stream improvement if the full benefits of either are to be achieved.

The improvements are designed to address two components of stream improvement; reducing sediment inputs and fisheries rehabilitation. While the end result of implementing either of the two components may be similar (ie. sediment control will have fisheries benefits), they are achieved through different means. Ideally, funding would be directed at both of these components.

### Dependent Projects

The potential improvements to the existing stream improvement programs are not dependent on any other Component Action except in terms of competition for available resources. Many other Component Actions are related and provide additional information. These include:

- 4.1.3 Sediment Control from Construction Activities
- 4.1.4 Erosion Control
- 5.3.1 Stream Clean-up (SCOUR)
- 5.4.2 Non Government Stream Improvement Programs

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### Monitoring Requirements

Under the present system, rehabilitation efforts are usually undertaken without the luxury of pre/post construction monitoring due to a lack of available resources. From a fisheries perspective, it would be particularly valuable to assess improvements by conducting population estimates and species inventories. This would require in-stream monitoring using a back-pack electroshocker to collect fish for population estimates. These efforts would occur before the rehabilitation projects are undertaken, and would be completed again approximately one year later. When local community groups or anglers associations are involved through the Community Fisheries Involvement Program, the success of any stream improvement efforts can be more easily gauged since they are usually familiar with the existing fisheries resource and are able to note improvements.

Where sediment control is the primary objective, such as when a cedar log crib or rip rap project is completed to stabilize a streambank to reduce sediment inputs, the same pre/post monitoring is not as important. On a site-by-site basis, it is difficult to quantify reduction of sediments by collecting water samples, especially when the site is small. Follow-up inspections are considered adequate to qualitatively assess the success of the project. These should be conducted during late spring of each year after ice-out has occurred and before lush vegetation develops. Inspections are particularly useful at this time of the year since ice or flood damage is more clearly evident.

### Reporting

These type of projects lend themselves quite well to a rigid reporting schedule. It is anticipated that an annual report would include the following:

- . number and length of stream surveyed
- . number of high priority fisheries sites
- . number of high priority sediment generating sites
- . number of meters of stream rehabilitated.

This information could be documented by staff of the Conservation Authority or the Ministry of Natural Resources and provide to the RAP for inclusion in its' annual report.

### Implementation

Implementation could be undertaken rapidly once staff and resources are available.

### Potential Delays

There is little potential for delay once resources are made available. Inventory and prioritization studies would require one year.

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### Summary Information for Implementation

Component Action:	Agency Stream Improvement
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Sediment Control (Construction) Erosion Control Stream Clean-up (SCOUR) Non Government Stream Improvement
Implementation Responsibility:	MTRCA/MNR/public groups
Funding Responsibility:	province/municipalities
Additional Costs Range:	Province: \$ 330K in year 1 \$ 200K/year thereafter Municipalities: \$ 50K/year
Monitoring Requirements	fish inventories (before and after)
Reporting Requirements:	number of sites/sites rehabilitated
Timeframe:	immediate
Potential for Delay	low
Potential Reasons for Delay	funding/one year required for inventory

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### COMPONENT ACTION # 5.4.2:

### Encourage Public and NGO Improvement Programs

The majority of public groups and non-government organizations (NGOs) active on environmental issues, focus their efforts on public education and awareness or protection of valued resources. Efforts which address remediation usually involve projects which can involve interested individuals without a need for extensive training or expertise (eg. tree planting or valley clean-up). When a group is interested in implementation of a major remedial project, efforts are usually limited to consultation with the appropriate agency to encourage implementation. As discussed under Component Action # 5.2.1, as the RAP moves into the implementation phase there is expected to be an increased interest in community involvement in remediation projects.

Most NGOs possess members with substantial technical expertise in environmental matters. Relatively few are active in sponsoring remedial measures, primarily because of a lack of capital resources. There are examples of NGOs who have been active in seeking to design

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and raise the funds for specific remediation projects. To date the primary emphasis has been on the Black Creek watershed, within the Humber River basin. While this level of involvement will not be possible for all public groups, consideration should be given to supporting the Black Creek groups and encouraging direct participation in remediation efforts on other watersheds. This would permit a constant infusion of new ideas, greater mobilization of community resources and a stronger sense of community ownership in remedial efforts.

### Existing Programs

Those examples of NGO efforts in the preparation of proposed remedial measures, which have been brought to the attention of the RAP team, have been focused on the Black Creek watershed. The NGO groups active in this regard are the Conservation Council of Ontario and the Black Creek Project. The RAP has also received documentation of a proposal prepared by a consultant for remediation projects on the Don River. This latter effort is a private initiative, but the consultant is active on the Don River Task Force, sponsored by the City of Toronto. Discussion of this proposal is provided as an example of potential participation on watersheds other than Black Creek.

### **Conservation Council of Ontario**

The Conservation Council of Ontario (CCO) is a non-profit, non-political, public service body made up of over 30 member organizations, as well as individual members. It is dedicated to the conservation and wise use of our natural resources. The work of the CCO goes beyond remediation projects relevant to the Metro Toronto RAP, and includes review of government policies, development of education materials, and research on strategies for sustainable development. One of their major initiatives, conducted through their Water Task Force, is the Urban Streams Rehabilitation Project. This is a three year project which will seek to demonstrate the potential to rehabilitate degraded urban streams, using Black Creek as the demonstration site. While the overall project has many elements, the following remediation projects have been proposed. Each is a localized project with substantial potential for citizen involvement.

#### 1. The creation of a wetland and/or retention pond in the Town of Vaughan

The CCO proposes building of a wetland/retention pond and trail system, combined with tree planting, along the Hydro right-of-way at Jane St. and Steeles Avenue. This project is in support of efforts initiated by the Black Creek Project. Benefits of the project would include water quality improvement, wildlife and stream habitat enhancement, recreation and education opportunities, sediment and erosion control. The project would require 1-2 years two complete.

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### 2. A reforestation program to revegetate denuded areas in the Black Creek watershed

This would be a 3 year project to develop and implement a basin-wide reforestation program. As in the first proposal, this project builds upon previous efforts of the Black Creek Project. The benefits cited in the proposal include: wildlife and stream habitat enhancement; aesthetic improvements; erosion control; and stream shading.

### 3. In-stream habitat enhancement in the City of North York

This would be a one year project aimed at improving fish habitat in Black Creek between Sheppard and Finch avenues. Work would include physical improvements to the stream bed to create riffles and deep pools, gravel beds, scoured areas and oxygenated areas. The benefits cited include: improved habitat conditions for fish; increased recreational opportunities; aesthetic improvements; and increased education opportunities.

These projects were submitted to the Environmental Partners Fund (established by the federal government) for partial funding support, in the fall of 1989 and received approval for a grant of \$ 200,000 (contingent upon matching funds) during the winter of 1990. The total cost for these three projects is approximately \$ 440,000. The breakdown between projects is indicated below:

<u>Project 1</u>	<u>Project 2</u>	<u>Project 3</u>
\$ 135,086	\$ 232,420	\$ 71,970

The CCO proposals are oriented towards a co-operative approach involving NGOs, community groups, business and industry, municipalities and regulatory agencies. The projects include a substantial use of volunteer time, amounting to nearly 300 person-weeks. In comparison, about 240 person-weeks of paid time would be required to implement all three projects. CCO is currently seeking funding support from agencies and municipalities to supplement the monies approved through the Environmental Partners Fund.

### **The Black Creek Conservation Project**

The Black Creek Conservation Project is a citizen's group formed in 1982 for the purpose of promoting and carrying out improvements to Black Creek and its valley lands. The Black Creek project is active on a number of fronts, but one of its' primary activities is the rehabilitation of degraded areas through small projects easily carried out by its members.

The Black Creek Project prepared a submission for the Environmental Partners Fund in the fall of 1989. A single project was proposed and is described briefly below.

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### 1. The Black Creek Improvement Project

Although this is considered a single project, it would involve work at a number of sites, divided into 3 work areas. The primary objective in each work area would be to control erosion through the use of rip-rap and bioengineering methods. The second objective would be to construct bicycle and walking trails (linking up existing isolated trails) to create a continuous trail system. The benefits cited for the project include: erosion control; enhanced habitat for fish and wildlife; increased recreation potential; improved access to the valley lands.

The total cost of the proposed undertaking is about \$ 460,000. Work would be completed over two years. A breakdown of costs is provided below:

Rip-Rap	\$ 78,600
Trails	\$253,840
Planting	\$ 9,780
Equipment	\$ 36,678
Professional Services	<u>\$ 84,600</u>
	\$463,498

The work contemplated would utilize student labour wherever possible. Volunteer labour would be used for the planting work.

The Black Creek Project has received funding approval (with a matching funds requirement) for \$ 125,000 from the Environmental Partners Fund. The funding excludes the proposed work on trail creation, but includes the work with direct environmental benefits. The Black Creek projects and those being undertaken by CCO are being combined for administrative purposes.

### **Don River**

The Don River has received increased public attention in the last two years. The City of Toronto established the Don River Task Force with members from the public and citizens groups. A member of the Task Force, acting in a private capacity as a consultant, has prepared a proposal for the creation of a series of "mini-marshes". It should be stressed that this proposal is an individual's concept and therefore is not comparable to the previously discussed projects, which already have a strong basis for community involvement. While the proposal cites the potential for community involvement and the preparation of educational materials, this aspect is a service to be provided by the consultant rather than a commitment of community resources. The concept presented in the proposal is provided here as an example of a possible project and an indication of interest in areas outside of the Black Creek watershed.

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### 1. Mini-Marshes to clean and regulate Storm Runoff

The proposal is to develop a pilot project of three mini-marshes at storm sewer outlets in the Don River watershed which would act as mini-reservoirs and water purifiers. Each mini-marsh would probably be between one and two acres in total surface area. During storms these mini-marshes would absorb water and afterwards slowly release it. They would take the peaks out of storm water discharge rates at the selected sites. Erosion and flooding in the river valley would be slightly reduced. They would also provide small, natural areas for wildlife, increasing the diversity of habitats for many kinds of animals and plants.

This proposal is conceptual only with no background field work having been completed. The project would require complete development including planning, site selection, design and costing.

#### Potential Program Improvements

One of the fundamental aspects of the remedial action plan is that is to be a community-based, cooperative process, with all levels of government and the public working together to achieve joint goals. Cooperative action between community groups and government agencies has been growing. The RAP should seek to encourage active participation by community groups on all watersheds, not only in planning, but also in project implementation. The following potential improvements seek to promote this. Continuing input from groups active in the Public Advisory Committee process will allow refinement and/or additions during the RAP option selection process.

#### **A. Seek to Encourage NGOs with an Orientation towards Remedial Project Implementation**

At the present time there are relatively few groups with a project orientation, outside of the Black Creek watershed. Many groups are active in smaller scale remedial efforts and public education and these also may warrant assistance (see Component Action 5.3.2). It is very much in the interest of RAP implementation however to see a growth in the number of groups dedicated to the initiation of community action, in cooperation with existing agencies.

This matter needs to be explored more fully before specific proposals can be made. There is tremendous energy among public groups, but volunteer technical resources may be a limiting factor in the establishment of project-oriented groups on a number of RAP watersheds or subwatersheds.

No costs can be provided for this potential improvement at this time. Further discussion during the RAP option selection process may provide details which will allow a definition of what is needed, allowing estimation of costs.

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### **B. Involve NGOs directly on Implementation Committees For Specific Projects**

This potential improvement would require a substantial commitment of time, but far less than would be required under A. Examples of this type of involvement are rare at the implementation level, but the Rouge River Study and the RAP itself are examples of efforts which have involved the NGOs in the planning stages. Each of these programs expect continued NGO involvement during the implementation stage.

Within the context of this options paper, Component Actions 4.3.2 (multi-use stormwater pond pilot projects) and 5.4.1 (agency stream improvement programs) would benefit most from NGO expertise at the project implementation level. Involvement would not entail any additional costs to agencies but would place an additional stress on NGO resources. Very preliminary discussions with the Conservation Council of Ontario in relation to the proposed Emery Creek pilot project on the Humber River, suggested that participation on the implementation team was possible.

### **C. Determine the Preferred Means of Providing Support to NGO Sponsored Initiatives**

A number of Component Actions contained in this Remedial intent seek to provide the means of providing support to NGOs (eg. RAP library/resource centre; Foundation for Grants). There may be however, the need for additional support of NGO projects in the short term. The Conservation Council of Ontario has raised approximately \$ 100,000 dollars in matching funds to date, and it is anticipated that about 50% of these funds will be used towards the matching funds requirement of the Environmental Partners Fund grant. CCO is in the process of negotiating addition matching funds or "in-kind" services from provincial agencies, municipalities, industry and private sources. The Environmental Partners Fund has agreed to provide sufficient "up-front" funding, based on the matching funds raised to date, to allow project initiation this spring.

As indicated in Component Action 5.2.1 (Foundation for Grants) the generation of funds from the community at large is desirable in promoting the cooperative efforts required for remediation. It would therefore be inappropriate to suggest RAP funding of NGO initiatives at this point. The RAP should be prepared however, to offer non-monetary assistance, as required, to further the efforts of NGOs, wherever possible.

#### Potential Program Benefits

The potential improvements cited under this section are all aimed at encouraging the participation of the public, particularly those involved on continuing basis through community groups or non-government organizations, in all stage of remediation from planning through implementation. The RAP is intended to be a community based effort, mobilizing public resources as well as those of government agencies and industry.

Input from NGOs and the public will not only provide direction to the plan, but will provide an additional source of expertise for project implementation. Direct involvement in

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remediation will enhance public support for the RAP and will increase public awareness of environmental issues and their ability to affect them. The completion of projects will not only have beneficial effects on public awareness and involvement, but will also of course contribute directly to remediation, restoration and enhancement, in the same manner as agency sponsored initiatives.

### Dependent Projects

NGO participation in environmental projects has been growing steadily in the last several years. The RAP will benefit from this. In order to maximize these the benefits within the context of the RAP, NGO participation should be encouraged, especially in the watersheds which are not currently the focus of NGO programs. The Component Actions which will allow the RAP to promote increased involvement include:

- 5.1.1 RAP Communications Plan
- 5.1.2 RAP Library/Resource Centre
- 5.2.1 Foundation for Grants

The following Component Actions, if selected for implementation, would allow the greatest opportunities for increased participation by NGOs in agency sponsored remediation projects:

- 4.3.2 Pilot Multi-use Stormwater Ponds
- 5.4.1 Agency Sponsored Stream Improvement Projects

### Monitoring Requirements

The monitoring requirements for NGO sponsored remediation efforts would be the same as those documented under the applicable agency sponsored programs. The overall RAP monitoring strategy must account for projects undertaken through NGOs.

### Reporting

Reporting will be project dependent and will depend on the resources available to the NGO. The RAP should encourage submission of reports on progress so that they can be included in the annual RAP report.

### Implementation

Implementation of improvements A and C must await further consultation and refinement. Implementation of option B could be undertaken immediately, with the agreement of agencies and non-government organizations. NGO involvement would require participation during working hours which may cause difficulties in some instances, because NGO experts are often volunteers, rather than paid staff.

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### Potential Delays

The main reason for possible delay is expected to involve the volunteer technical resources available to NGOs. This may result in delays in the establishment of groups with a project orientation.

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### Summary Information for Implementation

Component Action:	Non Government Organization Projects
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	RAP Communications Plan RAP Library/Resource Centre Foundation for Grants Pilot Stormwater Ponds Agency Stream Improvement
Implementation Responsibility:	public groups, existing implementation committees
Funding Responsibility:	public groups
Additional Costs Range:	
Monitoring Requirements	as per agency programs
Reporting Requirements:	RAP annual report
Timeframe:	immediate
Potential for Delay	medium
Potential Reasons for Delay	NGO resources

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### Reference Documents

1. Environmental Partners Fund Application: Urban Streams Rehabilitation Project, The Conservation Council of Ontario, September 1989
2. Environmental Partners Fund Application: The Black Creek Improvement Project, The black Creek Conservation Project, August 1989
3. Cleaning the Don River: Mini-Marshes to Clean and Regulate Storm Run-off; unsolicited proposal provided by Mark E. Taylor, Ph.D., October 1989

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### REMEDIAL INTENT #6

#### FOSTER ECOSYSTEM THINKING BOTH WITHIN AND OUTSIDE THE METRO TORONTO RAP

##### Summary of the Problem

Many of the problems in the Metro Toronto RAP area have occurred and continue to occur as a result the manner in which our cities' infrastructure have developed over time, and the attitudes and perceptions of society. The ecosystem of our rivers and lake is resilient and for decades only limited notice has been taken of the cumulative effects of our decisions. The result of this is that the majority of proposed actions in this paper are remedial in nature; that is they seek to correct existing problems. Remedial actions are much more expensive, and much less cost-effective than preventive measures. If continued degradation is to be avoided in the future, "ecosystem thinking" must be incorporated into the way we view and manage our cities and ourselves. The cost to the aquatic ecosystem must be accounted for in future decision-making.

In order to encourage "ecosystem thinking", it is necessary to be aware of issues within the Metro Toronto RAP area and as well as outside. Education is important and many of the Component Actions documented in this paper have an educational element. Remedial Intent # 5, focuses specifically on actions which will heighten environmental awareness. There is a need go beyond this, however, to ensure that those active in the decision-making process, whether as members of agencies or public groups, are kept informed of actions being taken in the Great Lakes Basin as a whole, and to focus internal discussions on the means of addressing the goal of ecosystem management within the Metro Toronto RAP area.

##### REMEDIAL ACTION # 6.1:

##### Encourage Public Awareness and Communication with Other RAPs

Public consultation is a cornerstone of the RAP process. Active public involvement in the preparation and implementation of the plan is required in order to make it a community-based plan and to promote community support for RAP measures. Public participants in the RAP process are naturally oriented towards local action. Consultation efforts to date, however, have indicated the desire on the part of the Metro Toronto RAP's public to express their concerns and provide the weight of public support to the actions needed in other RAP areas to ensure efforts in Toronto are not compromised. Further, a need is seen for the exchange of ideas and information among members of the public involved in the different RAPs, in order to enhance public involvement throughout the program. Similar needs have been expressed in other RAP areas. The following two Component Actions seek to address these needs.

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### COMPONENT ACTION # 6.1.1:

#### Provide the Means by which the Toronto Public Can Express Concerns and Support to Other RAPs

Consultation during the RAP development process has identified the strong desire on the part of the public to provide input and support to other initiatives which may have a significant impact on Toronto's water quality. RAP Goal 9, established by the PAC states:

Opportunities should be created and resources identified for the Metro Toronto RAP, in the spirit of cooperation, to have input to plans in other areas, such as the Niagara River or the setting of water levels, which have significant impact on Toronto's water quality.

Efforts have been made to meet this goal. Continuation of these efforts is anticipated and they are documented here in order to generate comment and feed-back.

#### Existing Program

The main efforts in this area have been conducted under the overall RAP program, rather than one specific to the Metro Toronto RAP. The main element of the program has been for the RAP process to cover expenses of RAP participants wishing to participate in RAP or PAC related conferences or conferences/meetings sponsored by the IJC. Highlights of this program include:

- o participation in annual PAC conferences aimed at bringing PAC participants from all RAP areas together to discuss common problems, concerns and solutions.
- o participation in regional conferences (eg. Lake Superior RAPs)

Annual PAC conferences have been run by Great Lakes United (GLU) and COA (Canada-Ontario Agreement). The COA program has been providing approximately \$10,000/year for to cover expenses to support participation in these conferences. Participation is normally limited to two designated participants per PAC.

In addition to COA's overall RAP program, each PAC also has a budget, which may be used to support participation. In the Metro Toronto RAP, the PAC budget has been used to:

- o pay expenses for PAC members to attend the IJC annual meeting in Burlington.
- o pay expenses of a PAC member, who assisted the RAP in its presentation of the Stage 1 report to the IJC Restoration Subcommittee, in Windsor.

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### Potential Program Improvements

The participation by PAC representatives in various conferences and presentations has been a benefit to the RAP program. Support so that people can participate in events which will benefit the RAP is expected to continue. Response from members of PAC who have participated has been positive.

The potential improvements which could be made will be a subject of ongoing discussion. It is anticipated that budgets and criteria for reimbursement will remain approximately the same. One potential improvement would be for the PAC to take a more active role in conferences and workshops. To date, PAC representatives have been "listeners" at the events they have attended. The PAC may decide that it wishes to make presentations or submit written briefs to conferences or other RAPs. The RAP program can accommodate this and the primary limitation would be the availability of time on the part of PAC members. The PAC will determine the best use of their time through the development of a strategic plan (the PAC has initiated internal discussions in this area).

### Potential Program Benefits

PAC participation in conferences and RAP related meetings has provided input to the overall RAP program. The results of this input has been manifest in program initiatives such as the Public Involvement Guidelines, revised in February 1990 to include a discussion of the public's role during implementation of RAPs. From the Metro Toronto RAP perspective, PAC assistance in its' presentation of the Stage 1 Report (Environmental Conditions and Problem Definition) to the IJC Restoration Subcommittee, strengthened the position of the RAP in indicating the emphasis on "getting on with the job" of remediation.

### Dependent Projects

None of the other Component Actions provided in this document are directly dependent upon this component. A number of actions listed in Remedial Intent # 5 also require commitment of time on the part of public participants. To date limits on available time has not prevented participation.

Component Actions 6.1.2 and 6.2.1 each are related to this action, in that they seek to expand the information available to the participants.

### Monitoring Requirements

There are no ambient monitoring requirements for this action.

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### Reporting

PAC representatives who attend conferences deliver a summary report to the PAC, which is incorporated into PAC minutes. The PAC periodically prepares a summary of activities for preceding months. The activities of the PAC should be summarized in the annual RAP report.

### Implementation

The program is ongoing.

### Potential Delays

None.

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### Summary Information for Implementation

Component Action: PAC Involvement in Programs Outside  
the Metro Toronto RAP

Priority of Remedial Intent:  
Priority of Component Action:

Related Programs/Projects: PAC Network  
Lake Ontario Toxics Management Plan

Implementation Responsibility: Provincial/Federal/PAC  
Funding Responsibility: Provincial/Federal

Additional Costs Range: continue current levels

Monitoring Requirements: none  
Reporting Requirements: Annual progress report

Timeframe: ongoing  
Potential for Delay: low  
Potential Reasons for Delay: none

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### COMPONENT ACTION # 6.1.2:

### Create a PAC Network to Facilitate Communication Between RAPs

Public participants in many environmental forums have suggested the need for citizens' networks to ensure strong public participation. Action has been taken by a number of organizations to develop such networks. The question of whether a PAC network should be formed is raised for consideration.

#### Existing Programs

Various forms of networks have been established in recent years to link environmental and community groups across the province and even internationally. The majority of these efforts have been initiated by non governmental organizations (NGOs). Some of the networks are electronic, while others rely upon newsletters, mailing lists, travelling workshops or forums, or periodic reports. Examples of the types of efforts include:

- o networks such as those operated by the Ontario Environmental Network, Great Lakes United, or the Lake Ontario Organizing Network (LOON).
- o Great Lakes Basin newsletters such as those published by the International Joint Commission and the Centre for the Great Lakes Foundation.
- o Fact sheets, such as those produced and distributed by the Centre for the Great Lakes, individual RAPs, and COA.
- o Specific reports by groups such as Greenpeace, Great Lakes United, and Pollution Probe, prepared to focus attention on specific issues
- o Libraries maintained by groups such as the Canadian Environmental Law Association (CELA)

This list is not exhaustive. It is included primarily to indicate the Metro Toronto RAP must be careful not to "re-create the wheel" in its efforts to assist the development of a PAC network.

#### Potential Program Improvements

It is not intended to provide possible improvements at this time except as concepts to stimulate discussion. Further refinements and development of a strategy will be forthcoming from discussions during the option selection process. Possible ideas include:

- o production of a RAP program bulletin for circulation to all PACs
- o exchange of PAC mailing lists

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- o distribution of quarterly or semi-annual progress reports on the seventeen Ontario RAPs
- o exchange of speakers between PACs
- o lending of audio-visual or slides shows produced by individual PACs (for public education purposes) to other PACs

Additional ideas are expected to be forthcoming from the PAC.

### Potential Program Benefits

Exchange of information and ideas among the PACs will encourage the ecosystem approach required for implementation of the RAP program. It will produce stronger public input to all phases of the RAPs. Discussions are required to determine whether a PAC network is warranted, or whether the exchange of information between RAPs is best left to non governmental organizations.

### Dependent Projects

None of the other Component Actions provided in this document are directly dependent upon this component. The development of a RAP communications plan (# 5.1.1) is a related action. Component Actions 6.1.1 and 6.2.1 each are related to this action, in that they seek to expand the information available to the participants.

### Monitoring Requirements

There are no ambient monitoring requirements for this action.

### Reporting

There are no reporting requirements for this Component Action.

### Implementation

Further discussion is required prior to consideration of implementation.

### Potential Delays

None.

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### Summary Information for Implementation

Component Action: PAC Network

Priority of Remedial Intent:  
Priority of Component Action:

Related Programs/Projects: RAP Communications Plan (5.1.1)  
PAC involvement in RAP conferences (6.1.1)  
Lake Ontario Toxics Management Plan (6.2.1)

Implementation Responsibility: PACs  
Funding Responsibility: RAP program

Additional Costs Range: to be determined

Monitoring Requirements: none  
Reporting Requirements: none

Timeframe: ongoing  
Potential for Delay: low  
Potential Reasons for Delay: none

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### REMEDIAL ACTION # 6.2: Ensure Toronto Public is Kept Informed of Progress on Initiatives Outside The Toronto RAP Area

Most use impairments in the Toronto area are the result of local pollution sources alone. Some the problems and concerns, however, result from a combination of local and lakewide problems. Foremost among these are restrictions on the consumption of fish and concerns about the quality of Lake Ontario as a source of drinking water. In the case of fish consumption, many of the advisories are driven by levels of Mirex, which is believed to come primarily from Lake Ontario as a result of its being discharged from the Niagara River. Levels of contaminants which may effect drinking water supplies is a lake-wide problem, requiring remedial action in all RAP areas, as well other areas outside the Areas of Concern.

The basis for Remedial Action Plans is the Great Lakes Water Quality Agreement (GLWQA). The 1978 GLWQA was amended by protocol on November 18, 1987. Annex 2 of the amended agreement established the basis for the development of Remedial Action Plans and Lake-wide Management Plans. The Metro Toronto Remedial Action Plan is one of seventeen RAPs under way in Ontario. While action in the RAP areas are expected to yield major reductions in contaminant loadings to the Great Lakes, there is a need to go further in

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examining and reducing contamination from sources not contained within the RAP areas. The second element of the overall initiative, within the context of the Metro Toronto RAP, is the development of the management plan for Lake Ontario.

The efforts of the Metro Toronto RAP and its' public and technical committees will focus on local sources of contamination. There is a need to keep informed however, on progress outside of the Metro Toronto RAP area, because final restoration will require actions beyond those which can be taken locally. Monitoring the progress of the development of the Lake Ontario Toxics Management Plan is one means of keeping informed.

### COMPONENT ACTION # 6.2.1

#### Encourage Awareness and Participation in the Lake Ontario Toxics Management Plan

The Lake Ontario Toxics Management Plan was adopted in February 1989 by four participating parties: Environment Canada, United States Environmental Protection Agency, Ontario Ministry of the Environment, and the New York State Department of Environmental Conservation. The plan:

- aggregates existing, readily available information on toxics in Lake Ontario;
- describes major existing and developing programs to control toxics in the U.S. and Canadian portions of the Lake Ontario drainage basin (action items and target dates are specified);
- defines a logical approach to gathering additional, essential information; and,
- develops a management framework within which to monitor progress under the plan and make further required commitments for the cleanup of the lake;

The Plan is to be managed by the four-party Lake Ontario Secretariat, working under the policy-level direction of the Niagara River/Lake Ontario Coordination Committee.

The Goal of the Plan is "a Lake that provides drinking water and fish that are safe for unlimited human consumption, and that allows natural reproduction, within the ecosystem, of the most sensitive native species, such as bald eagles, ospreys, mink and otters".

In order to achieve this goal, the Plan includes four objectives:

- reductions in toxic inputs driven by existing and developing programs;
- further reductions in toxic inputs driven by special efforts in geographic areas of concern;
- further reductions in toxic inputs driven by lake-wide analyses of pollutant fate; and,
- zero discharge.

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Three multi-agency committees are established under the Secretariat to carry out specific implementation tasks not covered under existing programs:

- the Categorization Committee will maintain and refine the chemical-by-chemical categorization of toxics;
- the Standards and Criteria Committee will ensure that a consistent set of adequately protective, legally enforceable standards are available; and,
- the Fate of Toxics Committee will develop mathematical models relating toxic inputs to lake responses.

These committees function jointly under the Lake Ontario and Niagara River Toxics Management Plans. Canada and the United States have also jointly established an Ecosystem Objectives Committee which will develop objectives for Lake Ontario and other Great Lakes. The Plan indicates that, based on initial modelling of loadings and toxic fate, preliminary load reduction targets will be established in 1990; final load reduction targets to achieve objective standards will be developed by 1994.

Provision is made in the Plan for annual progress reporting and updating and for public involvement in monitoring and advising on Plan implementation.

### Existing Programs

The LOTMP provides a consolidated description of a wide range of existing and planned programs which directly or indirectly will reduce loadings of toxic substances to Lake Ontario. Many of these programs have direct relevance to the Toronto RAP and are referenced in detail elsewhere in this document. The Toronto RAP itself is cited in the LOTMP as a key initiative by which loadings to the Lake will be reduced. To the extent that conditions within the Metro Toronto Area of Concern (AOC) are affected by lakewide loadings of toxics, the more broadly based actions identified in the Plan will work to achieve the objectives of the Toronto RAP. Examples of such basin-wide actions on the Canadian side of the Lake include:

- controls on direct and indirect industrial discharges (MISA);
- controls on municipal wastewater treatment plant discharges (MISA);
- approval, inspection and monitoring of waste disposal sites;
- CSO remediation through the Sewer Construction Grant Program and the Pollution Control Planning Study Grant Program;

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- reduction of stormwater runoff through the Urban Drainage Program and municipal adoption of a model Sewer-Use Bylaw;
- control of non-point agricultural sources through services and programs individually or jointly delivered by Ontario Environment and the Ontario Ministry of Agriculture and Food;
- reduction of air toxic emissions by application of regulatory controls under revisions to Regulation 308 and establishment of a toxics monitoring network (Ontario Clean Air Program);
- reduction of spill incidence and severity through application and enforcement of Part IX of the Ontario Environmental Protection Act and voluntary industrial control activities;
- collection and proper disposal of household hazardous wastes, as implemented by municipalities with technical and grant assistance from the Ministry of Environment;

Incremental activities specifically supported under the auspices of LOTMP are restricted at present to the Committee functions noted above.

### Potential Program Improvements

The LOTMP will, over time, identify program improvements required to achieve chemical specific and ecosystem objectives. From a planning perspective it is initially expected that improvements will be required in the areas of: loadings estimation, pollutant fate modelling, and biomonitoring. The Fate of Toxics Committee will define additional sampling, analysis and research necessary to develop improved models of toxic fate. The LOTMP commits the participating agencies to the development of a consistent set of adequately protective, legally enforceable standards for priority toxics and to the evaluation and selection of any further water quality-based control programs required to achieve chemical specific and ecosystem objectives.

Considering the LOTMP as a program unto itself, particular attention will be given to monitoring and assessing the effectiveness of the public involvement program associated with the plan, to information management and reporting mechanisms, and to assignment of appropriate resources to carry out committee activities.

A presentation was made by a representative of the LOTMP to the Metro Toronto RAP's public advisory committee (PAC) in the fall of 1989. It is anticipated that future presentations will be made on an annual basis, to keep the PAC advised of progress under the plan.

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### Potential Program Benefits

The LOTMP provides a geographically and institutionally integrated approach to the control and eventual virtual elimination of toxics in Lake Ontario. This integration will lead to more effective and efficient implementation of control strategies through achievement of:

- . consistency in jurisdictional standards;
- . compatibility in data collection, storage and analysis;
- . complementarity in program design and implementation;
- . enhanced understanding of basin-wide ecosystem functions;
- . an improved basis for prioritization of control efforts and allocation of resources.

The Plan provides a "one window" approach to public review and reporting on the many initiatives under way to eliminate toxics in Lake Ontario. As such, the annual reporting cycle identified in the plan will contribute to more effective dissemination of information to the public. In addition, the Plan provides for the development of ecosystem-based indicators by which progress in eliminating toxics and restoring ecosystem characteristics can be continuously monitored.

The Plan provides a logical framework for information collection and assessment and for subsequent management decision making with respect to elimination of toxics. Such a framework provides a clear and consistent basis for decision making which is open to public scrutiny.

### Dependent Projects

The LOTMP is dependent on the implementation of component programs and projects by responsible parties, including: federal, state, provincial, and local governments; industries; and the general public. It depends on data and loading estimates provided by the RAP areas to provide much of the input to lakewide assessment and modelling efforts. The Ultimate success of the plan will be partially dependent upon the success of individual RAPs.

### Monitoring Requirements

It is expected that environmental monitoring requirements (water, biota, sediments) for the LOTMP will be largely fulfilled through existing mechanisms (e.g. federal and provincial Great Lakes surveillance activities). Additional requirements associated with chemical specific or ecosystem objectives are to be determined by the Standards and Criteria Committee and the Ecosystem Objectives Work Group.

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### Reporting

Lake Ontario status reports and Plan updates will be prepared on an annual basis. A brief summary of highlights of significance to Toronto concerns should be included in the annual report of the Metro Toronto RAP.

### Implementation

The Lake Ontario Secretariat, consisting of representatives of the four participating agencies, has day-to-day responsibility for implementation, reporting, and revision of the Plan. Individual agencies or parties with responsibilities for component activities in the Plan have the primary role in implementing those activities.

### Potential Delays

The modelling effort of the Fate of Toxics Committee is critical to maintaining timeframes identified in the Plan.

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### Summary Information for Implementation

Component Action:	Lake Ontario Toxics Management Plan
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	
Implementation Responsibility:	Provincial/Federal
Funding Responsibility:	Provincial/Federal
Additional Costs Range:	none applicable to Metro Toronto RAP
Monitoring Requirements:	RAP monitoring will provide input to the plan
Reporting Requirements:	Annual progress report
Timeframe:	ongoing
Potential for Delay:	medium
Potential Reasons for Delay:	Fate modelling is a developing science

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### **Reference Documents**

Lake Ontario Toxics Management Plan. A Report By The Lake Ontario Toxics Committee. February, 1989. Environment Canada and Ontario Ministry of the Environment. Toronto.

### **REMEDIAL ACTION # 6.3:**                      **Upgrade the Level of Environmental Input to Planning Processes**

Urban growth has doubled the Toronto region's population in the past 30 years. Current trends suggest the Greater Toronto Area will reach a population of six million within the next 20 years. If this growth is to be accommodated, careful planning will be required to avoid destruction of aquatic resources. It will be necessary to not only to ensure that growth does not cause further degradation of the aquatic environment and resources, but also to use development and re-development as an opportunity to correct existing impairments.

The Metro Toronto RAP involves all agencies having jurisdiction over programs, policies and decisions relating to aquatic environment and resources. It is a water quality based plan however, and does not have direct influence over local planning matters and therefore cannot replace the provisions of local official plans, zoning by-laws, or the established process for amending them. By virtue of its broad participation by all levels of government and its public consultation activities, it can however seek to influence planning decisions. In this regard, the COA (Canada-Ontario Agreement) Board of Review, which administers the Ontario RAPs has recommended that:

any development on land contiguous with or in close proximity to Areas of Concern be undertaken so that it maintains, protects and perhaps even improves water quality in the Area of Concern

The Metro Toronto RAP has undertaken a number of activities which seek to promote this recommendation. The RAP has held discussions with both The Royal Commission on the Future of the Toronto Waterfront and the provincial commission, headed by Ron Kanter, which is to develop a Greenlands Strategy for the Greater Toronto Area. The COA/RAP position has been provided to each, so that it can be incorporated into their deliberations.

The Royal Commission on the Future of the Toronto Waterfront (Crombie Commission) has a joint mandate from both the Canadian and Ontario governments to address the separate land use and environmental issues along the waterfront. This gives the Commission an unprecedented ability to promote its objectives. The Commission has strongly endorsed an ecosystem approach to resource management. Component Action # 6.3.1 discusses the Royal Commission and the potential for the RAP to benefit from its efforts.

The RAP has also established a subcommittee of the RAP's Technical Advisory Committee (TAC) to examine means of improving environmental input into planning processes. As a

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result of this committee's recommendations, a two day seminar was sponsored by the RAP to examine possible initiatives. The participants included provincial staff from Environment, Natural Resources and Municipal Affairs, MTRCA staff, and municipal representatives with legal and development control backgrounds.

The discussions held during this seminar are listed in Appendix A. It is intended that discussions continue at the subcommittee level. The discussion has been included in this paper so that additional comments can be provided by other agency staff, members of the PAC, and the public. The results of ongoing discussions are not intended to form a portion of the RAP, but will provide assistance to agencies and municipalities with a mandate over planning issues and processes.

### COMPONENT ACTION: # 6.3.1      Royal Commission on the Future of the Toronto Waterfront

Two major commissions are active in the Greater Toronto Area (GTA), which includes the Regions of Durham, York, Peel, Halton and Metropolitan Toronto. The Metro Toronto RAP, delineated on a watershed basis, includes portions of Durham, York and Peel, as well as Metro Toronto. Each of the commissions has a mandate to examine, among other things, many issues which relate strongly to the RAP's emphasis on aquatic resources.

The Royal Commission on the Future of the Toronto Waterfront (the Crombie Commission) was established as a federal Royal Commission in March of 1988. One of the Commission's areas of investigation is environment and health issues. In August of 1989, the Royal Commission released its first interim report. In October 1989, the province endorsed the Interim Report and gave the Honourable David Crombie a mandate to report to the province on waterfront development issues along the western basin of Lake Ontario. The province further agreed with the Commission's recommendation that an environmental evaluation of the portlands, from Yonge Street to Ashbridges Bay, be undertaken, and declared an area of Provincial Interest under the Planning Act, to facilitate this evaluation. This new provincial mandate, combined with the existing federal mandate, gave the Royal Commission a strong basis for promoting its objectives. The Royal Commission is to complete its work by June, 1991.

At the same time that the province added to the mandate of the Royal Commission, it announced the appointment of Mr. Ron Kanter, MPP, to develop a Greater Toronto Greenlands Strategy. Recommendations are to be made for a greening strategy to protect the natural landscape along the waterways from the Oak Ridges Moraine to the Lake. The Kanter Commission is to report by June, 1990.

The Metro Toronto RAP has been working closely with both of these commissions. The following sections are directed primarily at Royal Commission, because of the imminent completion of Mr. Kanter's work.

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### **Existing Programs**

The Royal Commission has conducted a great deal of work since the beginning of its mandate. The following represents a summary of the highlights of the Royal Commission's activities as they relate to the RAP.

- o in the Fall of 1988, the Environment and Health Committee was formed. The Metro Toronto RAP made a presentation to this committee and provided its Stage 1 report: Existing Conditions and Problem Definition. The committee submitted its report to the Royal Commission April of 1989.
- o in May of 1989, the Royal Commission held hearings on environment and health issues. Both the RAP and its Public Advisory Committee (PAC) made presentations at these hearings. The PAC subsequently transmitted the RAP goals it had established to the Royal Commission.
- o in August of 1989, the Royal Commission released its first interim report. The report made a number of recommendations regarding the RAP, including: move more urgently to prepare and implement the RAP; involve the public more effectively; undertake remedial actions as they are recommended; approve new development or redevelopment only on the basis of best available technology, economically achievable; institute a moratorium on new lakefilling until a comprehensive policy is developed and the Metro Toronto RAP has been approved. A further recommendation, not directed specifically at the RAP, was that a watershed approach be devised to preserve the waterfront, river valley systems, headwaters, wetlands and other significant features. The recommendation is similar to the ecosystem management approach, one of the goals established for the RAP by the Public Advisory Committee.
- o in October 1989, the Royal Commission was given a Provincial mandate.
- o in December 1989, the Royal Commission commenced its environmental audit of the port industrial district lands and east bayfront. The audit steering committee has three representatives who are involved in the RAP: the Metro Toronto RAP Chairman; the RAP team's federal representative; and a member of the RAP's Public Advisory Committee. The RAP was given the responsibility of providing background data on aquatic resources to the audit.
- o in January 1990, the Royal Commission announced that it would be continuing its public hearings in the spring. The environment and health (continued) hearings are to provide an opportunity for public comment on the Environmental Audit (Phase 1) and the progress of the Metro Toronto RAP. These hearings are to commence May 22, 1990. The RAP accelerated its development of this discussion

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paper in order to take advantage of this opportunity for additional public input. The RAP and the PAC will seek to monitor the Royal Commission hearings.

### Potential Improvements

Efforts should continue to maintain close cooperation between the Royal Commission and the RAP. Information exchange has increased, with RAP team members participating on the Environmental Audit Steering Committee, and the Royal Commission providing an observer at RAP team and PAC meetings. Efforts should continue to strengthen these linkages and to take advantage of the forum provided by the Royal Commission, through its hearings, to gather fresh input on issues relevant to the RAP. The following actions are possible in the near future. Additional opportunities may become available as the work of the Royal Commission proceeds.

#### **A. Monitor Royal Commission Hearings on Environment and Health**

The Royal Commission will commence a second round of public hearings on environment and health, on May 22, 1990. One of the topics identified by the Royal Commission in the public notices is the progress of the RAP. The RAP, having completed this options paper, is seeking to take advantage of this additional forum for public input. The current agenda being pursued is:

- o Completion and printing of the Draft Discussion Paper on Remedial Options, with a stand-alone Executive Summary, in April, 1990.
- o Mail out of the Executive Summary to the full RAP mailing list in mid-April, 1990.
- o Briefing of PAC, TAC and RAP team, April 17, 1990.
- o Regional briefing sessions for participants in the PAC sectors and the public, in Toronto, Woodbridge and Unionville in early May, 1990.
- o Royal Commission hearings begin May 22, 1990.

The details regarding the location and times of public meetings are being advertised. The Royal Commission has agreed to carry an insert in its newsletter, also providing information on the Draft Discussion Paper, in order to increase exposure and encourage people's use of the Commission's hearings.

The RAP encourages people to become involved in the RAP consultation process which will lead ultimately to the selection of options for the Draft RAP. The RAP process is oriented towards ongoing participation and consensus building. This form of participation requires a commitment of time, however, which is not possible for all people. The Royal Commission

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hearings provide an additional means for people to provide input to the RAP. The RAP has also made provision to receive written submissions.

The RAP has undertaken to monitor the Royal Commission hearings. The PAC has also decided that it will attempt to monitor the hearings.

### **B. Expand Working Relationship with the Royal Commission**

The common interests of the Royal Commission and the RAP in many areas provides opportunities for the two to work together. Communication and information dissemination can be enhanced by the continuation of cooperative efforts, such as exchanges of articles in the respective newsletters. Joint sponsorship of workshops could be considered in areas of common interest, such as innovative funding mechanisms. As described in Component Action 7.1.5, the RAP program is conducting a consultant study to examine the means available to fund remedial measures. The Royal Commission is also interested in potential funding mechanisms.

Since the Royal Commission will be hearing public comments on the RAP, the RAP will discuss common opportunities, once the hearings are completed.

### **C. Continue to Promote Ecosystem Management**

Both the Royal Commission and the RAP endorse the need for ecosystem management. The Royal Commission can seek to encourage all levels of government in this regard. The RAP can also seek to promote this, by structuring the actions to be taken under the remedial action plan in a manner which achieves an ecosystem approach while fitting into the jurisdictional framework which currently exists. This, combined with the RAP structure (which involves the public, agency staff, and municipal staff) and its promotion of multi-use projects and cooperative efforts between agencies and public groups, will help to achieve ecosystem management. The Royal Commission and the RAP each have strengths, which will help to further the goal of ecosystem management.

#### **Potential Benefits**

The Royal Commission hearings will provide an important opportunity for the RAP to receive input from those not already involved in the RAP. Although the Metro Toronto RAP currently has a mailing list of over 1200 individuals and groups, the additional exposure provided by the greater profile of the Royal Commission will allow the RAP to receive comment from more sources. These comments will augment those being provided through the Public Advisory Committee and its sectors, and the Technical Advisory Committee.

Beyond the opportunities for greater public input, the RAP will benefit from the work of the Royal Commission, in two main areas. First, the Royal Commission's mandate extends to

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land use issues, which is beyond the scope of the RAP mandate. The efforts of the Royal Commission is expected to provide useful direction on land use issues which will benefit the goals of the RAP. Secondly, the Royal Commission, by virtue of its combined federal and provincial mandates, and its focus on a broad range of municipal issues, has an unprecedented potential to forge the basis for ecosystem management on a watershed basis. The influence of the Royal Commission, on all levels of government, are expected to provide opportunities which would otherwise be unavailable. The RAP will benefit from the linkages formed by the Royal Commission and should pursue opportunities to work closely with the Commission in order to further common goals.

### Dependent Projects

The input provided through the Royal Commission hearings will provide a source of information to both the RAP team and the Public Advisory Committee, and will assist them in option selection process and the development of the Draft RAP.

### Monitoring Requirements

Water quality monitoring will not be required within the context of this component. It should be noted, however that as part of its Environment Audit, the Royal Commission is expected to recommend water quality monitoring where there are existing deficiencies. It is expected that some of these deficiencies will be resolved by the studies being conducted under the RAP, as described under Remedial Intent # 7. All available data has been provided to the Royal Commission, and additional information will be passed on as it is completed. With the focus of the Environmental Audit covering a smaller area than the RAP, the needs of the Royal Commission may be more detailed than those of the RAP, for the particular area in question. If additional monitoring is conducted for the Royal Commission, the sampling design should be integrated with the RAP monitoring strategy, in order to maximize benefits.

### Reporting

The Royal Commission will be producing a second interim report this summer which will report on the results of the hearings on environment and health.

### Implementation

The RAP program regarding the Royal Commission hearings is being implemented. Liaison and cooperation with the Royal Commission will continue. Possible improvements to this cooperation will be pursued after the hearings have been completed.

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### Potential Delays

No delays are anticipated.

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### Summary Information for Implementation

Component Action:	Royal Commission on the Future of the Toronto Waterfront
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	all
Implementation Responsibility:	RAP/Royal Commission
Funding Responsibility:	Provincial/Federal
Additional Costs Range:	staff and volunteer time
Monitoring Requirements:	
Reporting Requirements:	Royal Commission 2nd Interim Report
Timeframe:	ongoing
Potential for Delay:	none
Potential Reasons for Delay:	

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### REMEDIAL ACTION # 6.4:      Ensure Greater Coordination of Planning on a Watershed Basis

One of the main reasons cited for a lack of focused action on environmental issues in the Toronto RAP area is the lack of a single coordinating agency to oversee planning and implementation of programs on a broad scale. The study area for the Metro Toronto RAP is not linear; it includes the nearshore of Lake Ontario and six watersheds. Within this area are 14 local and 3 regional municipalities, half a dozen provincial agencies, several federal agencies, and numerous commissions, boards and crown corporations that have jurisdictional, resource management or legislative responsibilities. These divisions of the area into political units, resources and regulatory powers causes sectoral, fragmented, often conflicting and ineffective ecosystem management efforts that focus on blocks of land as common units for management decision-making. This is a major obstacle for the Metro Toronto RAP to overcome.

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As suggested in the discussion presented in Appendix A, there is a need for the development of a process for undertaking comprehensive resource management strategies within the Toronto RAP area. The actual execution of such strategies would be expected to be a cooperative effort, involving provincial resource agencies, municipalities, and the public. It would most efficient however, if a single agency were to be given the responsibility of coordinating both the development of the strategies and their implementation.

The Metro Toronto RAP involves all agencies active in the Toronto area and also provides a basis for continuing public involvement through its public consultation process. The RAP will take a lead role in ensuring implementation of actions to be taken under the final Remedial Action Plan. Watershed based strategy development however, represents a level of detail which the RAP cannot address, in a timely manner, unless there is a substantial increase in staffing. As an alternative, an existing agency could assume a coordination role in the development of the necessary strategies. The strategy development would have to be consistent with the overall Remedial Action Plan, and would be in effect a watershed action plan.

Possible candidates for this coordination role include the Ministries of Natural Resources and Environment, and the Metropolitan Toronto and Region Conservation Authority. Each of these agencies have traditionally operated on a geographical scale which would facilitate coordination across the entire RAP area, with emphasis on the watershed as the basic unit. The development of watershed strategies have been led by both Environment Ontario (Don River) and the Conservation Authority (Rouge River). MTRCA has gone a step further however by tabling its Greenspace Plan. This plan is an effort to promote a resource management strategy for the nine watersheds under MTRCA's jurisdiction.

The Component Action which follows is a summary of the MTRCA Greenspace Plan. The elements of the Greenspace Plan which relate to the RAP goals are presented. The actions under each sub-strategy are broad, and many are outside of the RAP's mandate. The costs which are provided are for strategy implementation across MTRCA's jurisdiction, which includes watersheds outside of the Metro Toronto RAP area. The actions within each sub-strategy which are within the RAP's mandate, and the costs associated with these, are to be the subject of continuing discussion in the RAP process.

The presentation of the Greenspace Plan fulfils a second role in the RAP process, as it provides an example of a single agency assuming a coordination role within the Toronto RAP area. Determination of which agency should assume the role of coordinator, or whether a single agency is appropriate, will be the subject of discussions as the RAP proceeds toward the implementation phase.

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### COMPONENT ACTION # 6.4.1: Implement MTRCA's Greenspace Plan

The Metropolitan Toronto and Region Conservation Authority (MTRCA) is a provincial/municipal partnership established in 1957, under the Conservation Authorities Act. It covers the watersheds of nine river systems, from the headwaters to Lake Ontario, from Mississauga and Brampton east to Ajax and Uxbridge. It is the only agency that plans on a watershed basis and whose jurisdiction crosses municipal boundaries.

The Conservation Authorities Act gives the MTRCA the mandate to study the regional watershed and to develop a program for the conservation, restoration, development, and management of renewable natural resources. While the Authority follows provincial policies and guidelines, its programs and activities are in direct response to local needs. Consequently, the MTRCA has developed a series of strategies for achieving its vision. These strategies focus primarily on the Oak Ridges Moraine, watershed management, the waterfront, and the public use of Authority lands.

In 1986 MTRCA released its Watershed Plan which laid out the Conservation Authority's goals and objectives and the programs it uses to achieve these. This was taken a step further in 1988 when MTRCA released its Greenspace Plan. The Plan represents MTRCA's view of the strategies which should be pursued in order to fulfil the conservation needs of the greater Toronto region and ensure a healthy future for our natural resources.

#### Existing Programs

The 1986 Watershed Plan set out a series of remedial programs to be pursued by MTRCA. The remedial projects conducted under the Flood Control, Erosion Control, and Land Acquisition Programs have been the foundation of the Authority's work during the 1980's, and are expected to continue to be important in the 1990's. Some of the programs, such as flood control, do not have a direct benefit in terms of water quality improvement. They are documented here however, in recognition of MTRCA's mandate in areas outside of RAP concerns.

#### **Flood Control**

The Flood Control Program is designed to prevent, eliminate, or reduce the risk of hazard to life and property, while recognizing the value of retaining the natural attributes of the valley system.

There are two components to the program:

Preventative Measures include plan review, enforcement and study programs. The objectives and implementation are addressed by the Watershed Management Strategy

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of the Greenspace Plan and are described under potential improvement B in this document.

Remedial Measures - include reducing the risk of flooding in defined flood damage centres and flood vulnerable areas, identifying lands susceptible to flooding under the regional storm category, and acquiring such lands when necessary.

Lands are acquired in order to accommodate flood flows, protect flood storage areas, and to construct remedial works.

A total of 31 flood damage centres were identified in the Watershed Plan, and remedial projects have been completed at four of them, at an average cost of \$570,000 per year. Due to revisions to the flood vulnerable area policy, few flood vulnerable areas have been acquired. Flood proofing and upgrading measures have been used instead of acquisition. By establishing a program and identifying sites, there is an anticipation that remedial works will be conducted. At the present rate of implementation, the current list of projects would not be completed for 62 years. There is still a substantial amount of remedial work to be conducted in flood control, and the Authority is seeking an increase in funding for this Program, to an average annual rate of \$750,000.

### **Erosion Control Program**

The goal of the Erosion Control Program is to minimize the hazards to life and property caused by the erosion of river banks, valley walls, and shorelines, while recognizing the value of retaining the natural attributes of the valley and lakefront settings. It should be recognized that while this program has some benefit in reducing sediment production, this is not the program's primary focus. The Watershed Plan (1986) stated that approximately \$1.5 million should be allocated each year to erosion control projects. Major projects included Bellamy Road Ravine and the Scarborough Bluffs. Funding of these projects has diverted resources from other sites that resulted from heavy summer storms. In order to meet all of the objectives, funding for this remedial program should continue at the present level, or at a slightly increased level, for several more years. More detail on MTRCA's erosion control program is provided under Component Action # 4.1.4.

### **Land Acquisition Program**

The goal of this program is to acquire hazard and conservation land in order to prevent unwise land use that would affect the land's ability to perform its natural functions, and to conserve significant land for the benefit of the people within the region.

The Watershed Plan recommended an annual expenditure of \$1.5 million for land acquisition which has been virtually maintained in most years. The five year, \$48 million Hazard and Conservation Land Acquisition Project for Metropolitan Toronto, established in 1984, greatly

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enhanced the Land Acquisition Program, and has enabled the Authority to meet most of the current needs within Metro Toronto.

### Potential Program Improvements

The four strategies presented in this section are documented, in full, in the MTRCA Greenspace Plan. It is recognized that further refinement to the strategies will be necessary (MTRCA has recently tabled additional information on the Oak Ridges Moraine with its Board). The RAP seeks to encourage technical and public feedback by consideration of these strategies. Four main strategies are proposed. They include: the Oak Ridges Moraine; Watershed Management; Waterfront; and Public Use of Conservation Authority Lands.

#### **A. Oak Ridges Moraine**

The Oak Ridges Moraine is the source for most of the streams in the Toronto region. Future urbanization in the vicinity would hinder groundwater recharge from occurring and would have impacts on water quality and aquatic resources.

At the moment, there is no management plan that recognizes and protects the Moraine as a provincial resource. The MTRCA, which has the mandate to protect and manage natural resources in the region on a watershed basis, proposes to co-ordinate a management plan for the Moraine. It has developed a strategy that includes the following objectives:

- establish a land acquisition program to secure public ownership of key resource land, using funding from the Province, the municipalities, and The Metropolitan Toronto and Region Conservation Foundation;

- establish a pilot project in the Glen Major area to test a private lands conservation stewardship program, which would blend existing conservation services offered by the Authority with incentives to stimulate long-term co-operation with private landowners in the management of their lands;

- stimulate research into the inter-relationship of land use and the management of fragile resources;

- increase MTRCA regulatory control by extending flood and fill line mapping into streams of less than 13 square kilometres of drainage;

- co-operate with the Ontario Ministry of Natural Resources in implementing fisheries management projects as set out in the Fisheries Management Plan for Maple District;

- assist in the establishment of a trail system linking valley trails with the Niagara Escarpment trail system;

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establish a public awareness program to focus attention on the headwaters area and to recognize private landowners who are conserving their land;

promote a provincial policy developed by an inter-regional task force on planning legislation and inter-regional resources; and

establish a staff unit within the MTRCA to implement the strategy

MTRCA has recently tabled a report entitled "Interim Environmental Planning Guidelines for the Oak Ridges Moraine" with its Board. This document will form the basis for further work with the province and municipalities, aimed at implementing the strategy. The major cost of this strategy is a land acquisition program. Over a 10 year period this could cost \$ 50 million. To achieve the other objectives of the strategy, an annual cost of \$ 5 million is foreseen. A total annual budget of \$ 10 million would therefore be required.

Funding sources would comprise grants and transfer payments from the Province, municipal levies, contributions from private landowners, and donations from the Conservation Foundation. Assuming the historic breakdown between provincial and municipal contributions to MTRCA programs, this would mean an annual expenditure of \$5.5 million by the province and \$4.5 million by municipalities. These amounts would be reduced by any funds generated from private sources.

### **B. Watershed Management**

Urbanization is affecting the river valleys in the Toronto region. Water quality has deteriorated in the lower stretches of the rivers and current trends threaten both the middle sections of the rivers and the headwaters.

The MTRCA has proposed that it assume a leadership role in resource management within the regional watershed. The key elements of the Watershed Management Strategy are the following:

request the provincial government and member municipalities to support the Authority in coordinating inter-agency interests;

establish planning task forces for each major river watershed, focusing on co-ordination between agencies, the establishment of data bases, and the development of cause/effect analysis to aid in the designing of specific management techniques, similar to those now being developed for the Rouge River;

provide environmental services for municipalities, focusing on the river valleys, and emphasising the re-establishment of tree cover on valley slopes, improvement of water quality, and integration of natural areas with compatible public uses;

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ensure greater compliance with permits issued under Ontario Regulation 293/86, the Valley, Stream, and Waterfront Regulation;

accelerate acquisition of valley lands, including encouragement to other public agencies to acquire such lands;

expand communications with educators, public interest groups, and governments; and

re-allocate and retrain existing staff, where necessary, to reflect the new co-ordination, compliance, and service roles.

The MTRCA currently spends \$1.8 million per year for its conservation service, plan review, enforcement, and watershed study programs. The Watershed Management Strategy would require an increase of \$300,000 to \$2.1 million annually. Sources of the funding are expected to be provincial grants and municipal levies. An annual provincial cost of \$ 165K and a municipal cost \$ 135K/year is assumed.

### **C. Waterfront**

Existing waterfront facilities cannot meet the increasing public demand for recreation; there are concerns about water quality, the quality of fill and the availability of sites for lakefill projects. There is the need to complete acquisition plans to ensure public access across the waterfront and a need to re-evaluate the long-term direction of waterfront management, especially since most of the attention is focused primarily on the central waterfront.

The Waterfront strategy proposes that the Authority:

continue goals and objectives of the Watershed Plan;

continue land acquisition and land creation across the waterfront;

base all planning on the need for continuous public open space along the entire lakeshore;

co-ordinate all monitoring programs;

prepare management plans for environmentally significant areas;

implement the Improved Lakefill Quality Control Program, under an agreement with the Ontario Ministry of the Environment; and

review the current funding formulas.

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The Waterfront Development Program currently costs \$1.7 million annually. To achieve the objectives desired, the cost would rise to \$4.8 million annually. Expected funding sources are transfer payments, grants from the Province, municipal levies, and revenues from landfill projects. The provincial cost increase is assumed to be \$ 1.7 million annually, with a corresponding municipal increase of \$ 1.4 million annually.

### **D. Public Use of Conservation Authority Lands - Outdoor Recreation**

The Authority's conservation areas are facing new and conflicting demands due to the increase in outdoor recreation. MTRCA is striving to balance the protection and management of the region's resources with the changing demand for outdoor recreation.

The strategy for public use proposes that the Authority:

- prepare and regularly update an environmental data base;
- continue to manage Authority lands for the long-term conservation of renewable natural resources, and monitor the environmental impact of recreation;
- establish priorities for the types of recreational opportunities to be offered on Authority lands, based on sound resource management;
- develop multi-year concept plans for conservation areas, educational facilities, and the regional trail system;
- develop and operate regional outdoor recreation, education, and heritage programs on Authority lands, where the landholdings are large, the activities are compatible with the environment, and the programs are cost-effective;
- negotiate with provincial ministries and agencies to establish long-term operational and financial support programs;
- encourage The Metropolitan Toronto and Region Conservation Foundation to establish funds to those projects without sufficient revenues to meet operating costs;
- place selected land under management agreements with municipalities to create parks;
- invite the private sector to develop and operate selected recreational facilities, and
- seek multi-year funding for the development and re-development of selected conservation areas.

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In 1988, capital spending for the conservation areas was \$495,000. The Strategy proposes a 10-year expenditure of \$38-million, with half of the total coming from the private sector and other sources, and \$19-million, or \$1.9-million annually, coming from provincial transfer payments, grants and municipal levies. This translates into an expected provincial cost of about \$ 1 million/year and a corresponding municipal cost of \$ 0.9 million/year.

In addition to the four strategies discussed here, the Greenspace Plan contains strategies for archaeological resources and conservation education. These have not been presented here because costs for these strategies have not been determined.

### Potential Program Benefits

There is clearly a need for greater coordination in the management of the natural resources within the Metro Toronto RAP area. The MTRCA's Greenspace is one option which will promote this. Other agencies could perform a lead role in this regard but none are organized on a watershed basis. The watershed is the basic physical element of ecosystem management. Development of The Greenspace Plan and compliance with the plan will maintain and improve the quality of the region's lands and waters, contribute to public safety from flooding and erosion, provide for the acquisition of conservation and hazard lands and enhance the quality and variety of life in the community by using the lands for inter-regional outdoor recreation, heritage preservation, and conservation education.

### Dependent Projects

Many of the Conservation Authority programs discussed as Component Actions elsewhere in this report are related to or would form part of the Greenspace Plan. These include:

<u>Component Action #</u>	<u>Description</u>
1.4.1	Quality Control of Lakefill
3.3.1	Dry Weather Agricultural Controls
4.1.3	Sediment from Construction Activities
4.1.4	Erosion Control
4.1.5	Wet Weather Agricultural Controls
4.2.3	Rouge River Strategy
5.3.1	SCOUR (clean-up program)
5.4.1	Stream Improvement
6.3.1	Resource Management Plans

### Monitoring Requirements

Dependent upon specific potential improvements undertaken.

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### Reporting

To be determined after public and technical discussions have taken place under RAP.

### Implementation

Existing remedial programs, as set out in the Watershed Plan ( 1986), will remain in place when the Greenspace Plan for the Greater Toronto Region is implemented. Future changes are dependent upon development, review and adoption of the Greenspace Plan provided by MTRCA.

### Potential Delays

Agreement on funding to be provided by different agencies and levels of government may delay the implementation of the Greenspace Plan.

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### Summary Information for Implementation

Component Action:	The Greenspace Plan
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Most MTRCA programs
Implementation Responsibility:	MTRCA/Provincial/Municipal
Funding Responsibility:	MTRCA/Provincial/Municipal/private sector
Additional Costs Range:	Oak Ridges Moraine - \$10 million annually for 10 years. Watershed Management - \$300K annually Waterfront - \$3.1 million annually Outdoor Recreation - \$1.9 million annually
Monitoring Requirements:	option dependent
Reporting Requirements:	to be determined
Timeframe:	ongoing
Potential for Delay:	high
Potential Reasons for Delay:	Funding Approvals

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### Reference Documents

1. The Greenspace Plan for the Greater Toronto Region, MTRCA, Jan. 1989

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### REMEDIAL INTENT #7

#### CONDUCT RESEARCH IN SUPPORT OF SHORT AND LONG TERM RAP IMPLEMENTATION

##### Summary of the Problem

Research and studies are being conducted in the Toronto area to:

- o increase our knowledge to improve the basis for future decision-making
- o improve the baseline data available so that future progress may be judged
- o develop the tools necessary for a comprehensive monitoring strategy

Research is a necessary component in a cost effective program of remediation. Since the RAP is intended to be a continuing process, constantly updated as new information becomes available, it is important that the timing of ongoing studies is known during the option selection process.

A substantial body of knowledge has been accumulated through research in the Toronto area in the last two decades. There is sufficient knowledge to begin many of the remedial measures needed. There are however, some areas where our understanding is weak and where there are many unanswered questions. Examples of such areas are: the loads of toxic organics coming from storm sewers and combined sewers; atmospheric loadings of toxic organics; fish community dynamics; and fate and transport of toxics. Recognizing the time required to complete complex scientific studies, the RAP has proceeded with development of the plan based on our existing knowledge, while continuing to pursue research which will enhance our decision making capability in the future.

Part of the RAP process is the development of a monitoring strategy which will allow us to gauge progress of the actions taken and to document ultimate restoration. The Metro Toronto RAP is to embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in the area. In order to measure progress in a manner consistent with the ecosystem approach an extensive database and a comprehensive monitoring program is required. The RAP has initiated studies to upgrade baseline data and to determine the preferred means of monitoring. Continued research in this area is warranted in order to ensure effective use of resources and delivery of the most meaningful data. The component actions under Remedial Action #7.1 indicate the directions being pursued under the current research program. Potential extensions or improvements are documented, but not costed because under RAP implementation it is likely that research and monitoring for progress will be integrated. For the purposes of comparing this Remedial Intent to the others, an annual research allocation of \$ 500 K is recommended. It is assumed that the existing situation will continue and that the bulk of research monies will be provided by the province. The

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allocation provided is for discussion purposes only and will need to be confirmed within the context of the monitoring strategy as well as other remedial efforts.

The Metro Toronto RAP is oriented towards local action and as such the research projects described under Remedial Action # 7.1 are aimed at the specific needs of the RAP area. The Toronto RAP is not being conducted in isolation however, and there are many provincial and RAP program initiatives being pursued which will be of importance to the Toronto RAP. Some of these, such as the MISA program will be important because they will lead to contaminant reduction throughout the province. Others, such as the development of additional guidelines will be of use in assessing progress in a more meaningful manner. A number of programs which will effect the Toronto RAP are described briefly under Remedial Action # 7.2. Since these programs are not the responsibility of the Metro Toronto RAP, documentation of the existing programs is given, but no potential improvements or cost are provided.

### REMEDIAL ACTION #7.1:

#### Complete Studies Initiated Through the RAP in Order to Complete the Information Base

In support of a monitoring program, certain research and policy considerations have been identified and have or are being carried out. In addition, studies have been initiated in order to provide missing information for use in future decision making. Studies which have been initiated are described under the component actions. In addition, however the proposed workplan for 1990 has been provided below in order to give an indication of the current direction of research under the Toronto RAP. All projects will not proceed because of budget considerations. The RAP Steering Committee determines the projects to be funded in each year, based on need, merit, and available resources. The Toronto RAP's Science Subcommittee has prioritized the proposed studies for this year as follows:

- |   |       |
|---|-------|
| 1. (a)Toronto Waterfront - nesting rafts for Common Terns   | 12 K  |
| (b)Reef Placement Evaluation Study  | 35 K  |
| 2. (a)Toronto Waterfront Wet Weather Outfall Study,<br>City of Toronto (Component Action # 7.1.1) | 90 K  |
| (b)Assessment of Tributary and STP loadings to the<br>Metro Toronto Waterfront                    | 170 K |
| 3. Atmospheric Monitoring of Toxic Chemicals<br>(see Component Action # 7.1.7)                    | 85 K  |
| 4. Aquatic Ecosystem Health Assessment (toxicity)   | 80 K  |
| 5. (a)Long-term Fish Community Monitoring Along the<br>Toronto Waterfront (See # 7.1.6)           | 50 K  |

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(b)Monitoring of Water Temperature in Areas Identified as Critical Fish Habitat	30 K
<b>6. (a)Fate of Copper in the Ecosystem (modelling)</b> (see # 7.1.2)	<b>70 K</b>
<b>(b)Fate of Toxic Organic Contaminants</b>	<b>35 K</b>
<b>(c)Toronto Harbour Exchange</b>	<b>120 K</b>
7. Sediment Conductivity Measurements Using the Electromagnetic Method	68 K
8. (a)FLI Program for Mapping Toronto Waterfront	27 K
(b)GIS (proposal pending)	50 K
9. Rouge River: Feasibility Study for a Migratory Salmonoid Fishery	35 K
10. Fisheries Habitat Suitability Modelling	40 K

NOTE: Studies in bold indicate continuation of programs initiated in previous years.

In addition to these studies, several projects relating to the Toronto Waterfront proposed by agencies under existing mandates as part of their routine investigations. These include:

1. Toronto waterfront creel census	(25 K)
2. Experimental re-introductions of heritage fish species -feasibility study: Muskellunge, Walleye	(15 K)
3. Adult/juvenile fish transfers to select locations across the waterfront, expanding the distribution of largemouth and smallmouth bass, pike, walleye, crappies, etc.	(10 K)

Other projects may include:

- Zebra mussel initiative projects
- Regional fish and wildlife viewing brochure (with sites relevant to the waterfront)

Other sources of funding are also being pursued for Toronto environmental work such as 1990/91 projects submitted to the committee working on the Canada Ontario Memorandum of Intent for Great Lakes Rehabilitation which are as follows:

1. Reef complex-strategy for littoral zone habitat creation	164 K
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2. Esocid spawning and nursery habitat wetland enhancement	120 K
3. Scarborough Bluffs Park wetland creation and shoreline stabilization	85 K
4. Proactive fish community restructuring on the Toronto waterfront	54 K
5. Toronto waterfront littoral zone habitat modification	
- reef and shoal creation	105 K
6. Creation of a stable wetland in Mimico Creek estuary	80 K
7. Wetland creation and enhancement, Humber Bay Park East	45 K
8. Wetland creation Tommy Thompson Park, Leslie Street Spit	65 K

These projects are at the proposal stage only. They must compete for resources against other projects proposed in other RAPs. No decision has been made in terms of project selection.

### COMPONENT ACTION #7.1.1 :                      Complete Studies of Toxic Contaminant Sources

A study to assess loadings of toxic contaminants to the waterfront from storm sewer, combined sewer overflows, sewage treatment plant effluent and water filtration plant backwash water is in progress. Each of these discharges is a potential source of toxic chemicals.

Storm sewers and combined sewer overflows can be sources of various contaminants during rainfall, snowmelt and/or dry weather seepage. In addition, several storm sewers are used for the conveyance of industrial cooling water to the waterfront. Cooling water may contain contaminants leaked or spilled from the plant processes.

In the past, the focus of effluent sampling at the sewage treatment plants, some storm sewers and combined sewer overflows has been primarily on conventional water quality parameters such as bacteria, nutrients, and metals. Most monitoring programs have therefore not been designed for accurate chemical loading estimates. Analytical detection limits have for the most part been too high and quality assurance/control protocols have been inadequate. In addition, sample numbers were usually insufficient for statistical loading estimates.

The objectives of this toxic contaminants study are to provide:

1. an assessment and comparison of contaminant loadings from the various sources.
2. prioritization of outfalls for remediation on the basis of contaminant loadings during dry weather and runoff conditions.
3. an assessment of seasonal effects on these loadings.
4. sufficient data for the incorporation of loading estimates from these sources into the Toronto Waterfront near-shore modelling activities.

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5. provide a baseline against which the effects of future abatement activities can be assessed.

This will be accommodated by several study components. The field work component of a winter dry weather survey (1989) of priority outfalls discharging to the waterfront was recently completed. This study was complimented with a summer dry weather survey (1989) of the same outfalls and enhanced with wet weather monitoring. An urban runoff prediction model is being developed to assess the relative contaminant loading contributions during runoff conditions for outfalls in the Cities of Etobicoke and Scarborough. A similar wet weather study is being planned for outfalls in the City of Toronto for 1990.

In a 1988 pilot study of some of these outfalls, MOE placed the freshwater clam Elliptio complanata, in a number of priority outfalls to assess bioaccumulation of various contaminants under different flow and environmental conditions. This particular biomonitor filters and ingests particles from the water column and contaminant pulses are therefore concentrated in the animal's tissues. The tissue concentrations are time integrated, providing information of periodic contaminant releases which may go undetected in conventional sampling. This biomonitor will be deployed in a number of outfalls as part of the planned studies.

### Existing Programs

Several, municipality initiated, programs exist where conventional water quality (mainly bacteria) parameters are analyzed for the investigation of cross connection or CSO control difficulties. In addition, effluent samples from the sewage treatment plants are also routinely analyzed for conventional parameters. Currently, no other programs are involved specifically with the assessment of toxic contaminant loadings from the above-mentioned sources.

The current study has cost approximately \$ 470 K over two years. A large portion of the costs are sample analysis costs for toxic organics. The completion of studies to comply information on toxic loads are listed under item 2 (a and b) of the 1990 workplan.

### Potential Program Improvements

#### **A. Sample Additional Priority Outfalls**

In its present form the proposed wet-weather monitoring is limited to a few test catchments based on land use types and a few higher priority outfalls. The proposed modelling exercises will use this data to predict storm sewer and CSO loadings system-wide. Priority outfalls not monitored through the current studies should be targeted for future monitoring to improve the modelling predictions, loading assessments and the base line data set. This enhanced monitoring would provide a more detailed evaluation of problematic outfalls which may require remediation.

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The biomonitoring program should be enhanced to include all outfalls designated as high priority. The exposure time in this program will be dependent on the results of the biomonitoring research project.

### **B. Continue Sampling of Tributary Loads**

Enhanced monitoring for chemical contaminant loadings from all tributaries discharging to the waterfront should be conducted using sampling and QA/QC protocol similar to that adopted in the above-mentioned outfall monitoring program. Once completed, the relative contributions of toxic contaminant loadings from all sources to the waterfront can be evaluated using a comparable data base. Modelling exercises conducted in the nearshore areas of the waterfront can then better assess the relative impact of all sources and the effects on water quality, biota and sediments from proposed abatement activities.

### Potential Program Benefits

The current study will provide the RAP with information which will allow for the assessment of relative contaminant contributions from various point sources along the waterfront. This information will provide assistance when prioritizing abatement options at these sources. In addition, near shore modelling activities will be able to estimate the relative impact of storm and CSO loadings to Lake Ontario water quality, sediments and biota in comparison to other sources.

### Dependent Projects

The current study has been undertaken to fill in missing information with respect to the loading of toxic organics from storm sewers, combined sewer overflows and the STPs. While data has been available on STP loading rates, almost no data has been available for the other sources. The Fate and Transport Modelling project (Component Action 7.1.4) will rely on this study for its input.

Both this study and subsequent work on fate and transport will provide vital information with respect to the relative significance of the different types of loading sources. The information will be used by the RAP team, the TAC and the PAC to re-examine priorities and schedules and the allocation of resources once the studies are complete. The studies will not be completed in time for the initial round of option selection, but will feed into the continuing review and updating process envisioned for the RAP.

Biomonitoring Research (1989) - See Component Action # 7.1.4

### Monitoring Requirements

Study specific.

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### Reporting

A report detailing loading estimates for the following conditions will be produced:

1. Dry weather; summer and winter
2. Wet weather; Cities of Etobicoke and Scarborough
3. Wet weather; City of Toronto

The reports will include an assessment of the relative contaminant contributions from all point sources investigated. An interim report is expected in the Fall of 1990. the final report is expected in 1991. A summary of the results and conclusions will be incorporated into the appropriate annual RAP report.

### Implementation

The study is under way.

### Potential Delays

Continued funding is required to ensure that current schedules are kept. Delays in lab turn around on analyses have occurred in the past and may continue in future.

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### Summary Information for Implementation

Component Action:	Toxic Contaminants Study
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Fate and Transport Modelling Biomonitoring Research (1989)
Implementation Responsibility:	MOE
Funding Responsibility:	RAP
Additional Costs Range:	1988 - \$ 150 K 1989 - \$ 320 K 1990 - \$ 260 K (proposed)
Monitoring Requirements:	Study specific.
Reporting Requirements:	Final report in 1991.
Timeframe:	1988-91
Potential for Delay:	Low
Potential Reasons for Delay:	Funding in fiscal year 1990

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### **COMPONENT ACTION #7.1.2 :**     Complete Fate and Transport Modelling Study

A fate and transport modelling study has been undertaken by MOE in conjunction with Environment Canada under the Toronto MISA pilot site program in order to predict the relative impacts of discharges to the Toronto Waterfront on nearshore Lake Ontario environment. Although all known quantified sources will be included in this modelling effort, the primary emphasis will be the Main Toronto STP in order to fulfil the MISA terms of reference for this project.

The objective of the fate modelling study is to predict the relative impact of various discharges on nearshore Lake Ontario water quality, sediments and biota, as well as the extent of improvement which can be expected from reasonable abatement activities. More specifically, the following objectives are being considered.

1. Simulation of concentrations of several contaminants of concern in water, suspended and bottom sediments, and several levels of biota in the Metropolitan Toronto waterfront. Selected chemicals include total PCBs, dichlorobenzene, trichlorobenzene,

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hexachlorobenzene, dieldrin, alpha- and gamma-BHC, and alpha- and gamma-chlordane. The model is being calibrated to provide the best agreement with the ultra-trace (APLE) data collected in the lake during June, August and October 1987.

2. Estimation of the relative contribution of various sources to the contaminant concentrations in the Toronto waterfront. This can be accomplished by excluding in turn certain inputs to the waterfront. The following are considered: (a) all sources including Main STP; (b) all sources minus Main STP; (c) Main STP only; (d) all four STPs only; (e) tributaries and storm sewers only; (f) lake effects only are being done for a one- to two-year simulation period in order to approach steady-state levels in the various levels of the biotic food chain.
3. Estimation of the extent of loading reductions required to limit the zone of non-compliance with PWQO to 0 and 0.5 km from the Main STP outfall.
4. Estimation of the sensitivity of model predictions to the values of various model parameters.

The modelling is being conducted with the program TOXFATE, using as input the contaminant loadings from the STPs and tributaries in the Metropolitan Toronto region supplied by MOE, as well as the modelled currents as calculated using the RAND model by Gore and Storrie Limited under contract from MOE. Monthly average atmospheric input data (Air Resources Branch) and presently available sewer loadings (Great Lakes Section) will also be supplied.

### Existing Programs

This project was initiated primarily to examine the impact of the Main STP on near-shore waters. While this is important to the RAP it is insufficient in scope because efforts have been concentrated Main STP. Additional work in terms of data collection (see Component Action 7.1.1) and model development are required to make the model more general applicable to the full Metro Toronto RAP area. The 1990 workplan proposes work necessary for model development under item 6 (a-c) at a cost of \$ 225 K.

### Potential Program Improvements

In the future, this model will be rerun using updated loading information which will become available under the municipal loadings study carried out by the Great Lakes Section, MOE.

#### **A. Improve Loading Inputs for Modelling**

The municipal loadings necessary to improve the validity of the modelling exercise include the following sources:

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- sewers (SS, CSO)
- STPs
- Water Filtration Plant backwash

under the following weather-driven regimes:

- dry winter
- dry summer, spring, fall
- wet summer, spring, fall

Improvements in tributary loading estimates would also increase the validity of the modelling results. In addition, a multi-compartment model could be developed for the Toronto Waterfront in order to differentiate the responses within separate geographical areas such as Humber Bay or the Inner Harbour. Present organic toxicant modelling should be expanded to include inorganic (e.g., heavy metal) modelling.

### Potential Program Benefits

This modelling effort will enable the RAP Team to focus the remedial actions on priority source inputs as well as predict the extent of improvement which can be expected from proposed abatement activities.

### Dependent Projects

Toxic contaminant studies (municipal tributary and atmospheric inputs to the waterfront).

See also discussion under Component Action # 7.1.1

### Monitoring Requirements

See proposed monitoring efforts under the toxic contaminant studies project.

### Reporting

A report detailing model results for various abatement scenarios will be produced. The results and conclusions will be reported in the annual RAP report and will be used by the RAP team, the TAC and the PAC during periodic re-assessment of priorities and schedules.

### Implementation

Report dealing primarily with the Toronto Main STP will be produced in 1990. Further modelling runs will be dependent upon the availability of additional loading information to be generated by the toxic contaminant studies now under way. The 1990 workplan proposes model development specifically for copper and toxic organics. Actual modelling for RAP

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purposes, must await completion of the work under Component Action #7.1.1 (due in 1991). Fate and Transport model results should therefore be available in late 1991 or 1992.

### Potential Delays

Failure to fund model development in this fiscal year could result in a small delay.

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## SUMMARY INFORMATION FOR IMPLEMENTATION

Component Action:	Fate and Transport Modelling
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Toxic contaminant loading studies Atmospheric input studies
Implementation Responsibility:	Env. Can.
Funding Responsibility:	RAP
Additional Costs Range:	1990 - 85 K (proposed)
Monitoring Requirements:	See # 7.1.1
Reporting Requirements:	project report; Rap annual report
Timeframe:	1991-92
Potential for Delay:	medium
Potential Reasons for Delay:	Funding limitations

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### **COMPONENT ACTION #7.1.3:** Toronto Waterfront Sediment Study

Past sediment quality assessments have shown a tremendous range in toxic contaminant concentrations in Toronto Waterfront sediments. These studies have generally addressed small portions of the waterfront without concern for temporal or short-scale spatial variability. As sediments are an important component of the overall ecosystem, knowledge of spatial and temporal trends in sediment quality is important for assessment of the need for, and effectiveness of, various remedial actions. As much of the waterfront is located in a high-energy non-depositional zone, contaminated fine-grained material may briefly accumulate

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in certain areas before being transported offshore - hence, conditions may vary rapidly both on a seasonal and short-term spatial basis.

The purposes of the study are as follows:

1. To investigate in detail the within-year temporal variation of sediment quality in the Toronto Waterfront. The significance of seasonal variability and its possible spatial interaction will be investigated.
2. To evaluate the extent of sampling necessary to adequately define sediment quality at any one point, for purposes of a future detailed sediment survey.
3. To evaluate in finer detail the sediment composition in the vicinity of the Main STP, Humber Bay, Outer Harbour and Sam Smith lakefill site, using sediment electrical conductivity as a tracer.

### **Sediment Electromagnetic Conductivity Survey**

An electromagnetic conductivity was conducted within portions of the waterfront subject to inputs (Main STP vicinity and Humber Bay) and areas currently subject to lakefilling (Outer Harbour and Sam Smith site). In the Main STP area, past surveys have found great spatial variability due to temporary deposition of contaminated fine-grained material. In the last spring, summer and fall, a survey was carried out throughout each designated area. The survey was done by an external consultant.

### **Seasonal Sediment Survey**

Sediment samples were collected four times from June to October 1989 from five stations representative of various depositional environments across the Toronto Waterfront. These include known depositional zones (Inner Harbour, Humber Bay), and areas impacted by the lakefilling and Main STP.

### Existing Programs

Sediment monitoring is a portion of the ongoing activity carried out by MOE aimed at addressing the contaminant status of the Toronto waterfront. The project proposed in this year's workplan involve electromagnetic conductivity monitoring at a projected cost of \$68K. This work will establish a level of sampling required in order to establish a baseline grid of sediment quality throughout the waterfront, in order to complement other long-term toxic contaminant monitoring studies such as clam monitoring, spottail shiner collections, tributary mouth sampling and water intake programs.

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### Potential Program Improvements

After the results from this study become available, a comprehensive grid survey can be established which will provide a detailed picture of spatial variation in Toronto Waterfront sediment quality, as well as a baseline against which the effects of future abatement activities can be measured.

A two- or three-step extraction procedure for heavy metals in sediment is planned, which will estimate the proportion of heavy metals which are readily bioavailable to the benthos, and hence to organisms at higher levels in the food chain. This can lead to refinements in the existing dredge spoil disposal criteria.

### Potential Program Benefits

This study will establish the level of sampling necessary to adequately characterize the sediment quality at any one point throughout the year, and hence to estimate the significance of spatial differences observed across the waterfront in a future more detailed survey.

### Dependent Projects

Toxic contaminant studies.

### Monitoring Requirements

A sediment electromagnetic conductivity study will be conducted along the entire Toronto Waterfront with emphasis on areas impacted by inputs and/or lakefilling in order to establish the location of the most contaminated sediments for future samples.

### Reporting

A report will be produced making recommendations for an overall harbour-wide sediment monitoring program. The results of the work will be used in designing future monitoring efforts.

### Implementation

Report deadline: 1990-91

### Potential Delays

Moderate: Lab analysis

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### SUMMARY INFORMATION FOR IMPLEMENTATION

Component Action:	Sediment study
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Toxic contaminant studies
Implementation Responsibility:	MOE
Funding Responsibility:	RAP
Additional Costs Range:	1990 - \$ 68 K (proposed)
Monitoring Requirements:	project specific
Reporting Requirements:	project report
Timeframe:	Report by 1991
Potential for Delay:	Moderate
Potential Reasons for Delay:	Lab analysis

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### COMPONENT ACTION #7.1.4:      Complete 1989 Biomonitoring Research Study

The effectiveness of abatement measures brought about by RAP can be measured through the establishment of a long-term monitoring program. One of the more cost-effective methods of monitoring trends in trace contaminant levels in the environment is through a clam biomonitoring program. The first step of establishing such a program is to optimize exposure times and deployment regimes.

The freshwater clam, Elliptio complanata, is used routinely in bioaccumulation studies. The standard exposure period is three weeks and replication is usually carried out in triplicate. This relatively short exposure period often results in below-detection body burden results. In addition, a 3-week exposure is insufficient time for some compounds to reach a steady-state concentration in clams. For instance, a theoretical 95%, steady-state level is reached on day 45 for PCBs (most common congeners) and day 60 for mirex. These accumulation times may be even longer in the environment since input rates fluctuate in time and subsequently clams exposed to a pulsing input regime may undergo sequential depuration (elimination) and bioaccumulation uptake.

#### Existing Programs

This work will supplement other long-term monitoring trace contaminant studies carried out in the Toronto Waterfront area such as spottail shiner collections, tributary mouth sampling

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and water intake programs. There are no additional costs associated with this work as efforts have been combined with the Toxic Contaminants study (#7.1.1).

### Potential Program Improvements

The aim of this study is to derive optimum exposure regimes for PCBs (and other compounds if possible) under field conditions.

- (a) To assess the optimum exposure period of Elliptio complanata in the field in order to ensure attainment of steady-state conditions for a number of chemical compounds with emphasis on PCBs.
- (b) To assess the need to increase replication beyond the standard triplicate design.

A storm sewer outfall in the City of Etobicoke has been chosen as the site for this study. A current study has found water chemistry concentrations of PCBs in two grab samples at 40 and 73 ng/L, respectively. PCB concentrations in clam tissue from a clam exposed for 21 days at this location in December 1988 were found at 280 ng/g. An enclosure will be constructed at the foot of this sewer into which clams from Balsam Lake (6.5 - 7.2 cm's in size) will be deployed for a variety of exposure regimes including 1- 2- 3- 4- 6- 9- 12- and 15-week exposures.

Once the results from this biomonitoring research study become available, it will be possible to develop a comprehensive long-term monitoring trace contaminant study for the Toronto Waterfront.

### Potential Program Benefits

The effectiveness of abatement measures would be measured through a long-term trace contaminant program using clams as biomonitors.

### Dependent Projects

Toxic contaminant studies (municipal inputs to the waterfront).

### Monitoring Requirements

In this first phase of a long-term monitoring program clams were deployed for 1- 2- 3- 4- 6- 9- 12- and 15-week periods.

All work was done in replicates of 5 with the exception of the first 3-week exposure when the replication was set at 10. All clams were deployed loosely in the enclosure except for the 3-week exposure clams which were caged for easy retrieval.

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All clams will be analyzed for metals and organics including PCBs, chlorobenzenes and PAHs.

### Reporting

A report will be produced making recommendations for an optimized long-term contaminant monitoring program.

### Implementation

Report deadline: 1990/1991

### Potential Delays

High: Lab analysis

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## SUMMARY INFORMATION FOR IMPLEMENTATION

Component Action:	Biomonitoring Research (1989)
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Toxic contaminant studies
Implementation Responsibility:	MOE
Funding Responsibility:	RAP
Additional Costs Range:	
Monitoring Requirements:	project specific
Reporting Requirements:	project report
Timeframe:	Report by 1991
Potential for Delay:	High
Potential Reasons for Delay:	Lab analysis

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### COMPONENT ACTION #7.1.5:      Conduct Study of Funding Mechanisms

Assurance of adequate funding for remedial actions is a major challenge being faced as RAPs move from plan development to implementation. An assessment of existing and potential funding mechanisms is required to assist in the process of matching remedial options with

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implementation agencies and sources of funding. Environment Ontario and Environment Canada are therefore undertaking a study which will provide information for all RAPs, but which will focus especially on Toronto, Hamilton and the Bay of Quinte. The objectives of this study are:

- . to determine likely responsibilities for implementation of remedial actions;
- . to assess the adequacy of existing funding mechanisms (at the federal, provincial and municipal levels) available for use in the implementation of Remedial Action Plans; and,
- . to identify and evaluate alternative and innovative funding mechanisms which could be used for RAP implementation.

It is expected that the study will be contracted out for completion in July 1990. The adequacy of existing funding mechanisms will be assessed in terms of such factors as scope, eligibility, selection criteria, funding levels, institutional base, cost allocation formulae, and continuity. The study will examine innovative mechanisms employed in other jurisdictions and will consider modifications to mechanisms currently used in Ontario. Examples of innovative mechanisms include: voluntary contributions to foundations, dedicated bond issues, trust funds from resource revenue, revolving funds from levies, effluent charges, water use charges, and lotteries. The implications of innovative mechanisms will be examined from the perspective of equity in cost and benefit allocation and impacts on existing transfer payments.

### Existing Programs

Current provincial funding mechanisms (e.g. Provincial Capital Grants) have been identified and briefly described under a separate project. A report arising from this project is available. A key provincial mechanism currently under development is the Cleansweep Lottery. Federal mechanisms will be identified and reviewed in this study, including currently available information on the \$125 million Great Lakes Clean-Up initiative announced in October 1988.

### Potential Program Improvements

This study will examine the need for modifications and additions to existing funding mechanisms in light of RAP requirements. Follow-up work may be required to investigate the operational and legal feasibility of identified options and to ensure that the institutional and legislative base is in place to support development of alternative funding mechanisms.

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### Potential Program Benefits

This study has the potential to identify gaps in funding mechanisms required to support RAP implementation and to address those gaps with proposals for innovative solutions. Adoption of these general solutions could lead to more efficient negotiation of site-specific agreements and faster and more effective implementation of remedial actions.

### Dependent Projects

This study is not dependent on other projects. The project is expected to be complementary to financing investigations also being produced by Metropolitan Toronto (related move broadly to municipal infrastructure) and the Royal Commission on the Future of the Toronto Waterfront. It is expected that there will be opportunities for public discussion on a wide range of financing options for environmental protection during the Royal Commission hearings in the fall of 1990. The Policy and Planning Branch of the Ontario Environment is also currently undertaking related research into potential application of the "beneficiary pay" principle in areas of municipal sewer and water infrastructure improvement.

### Monitoring Requirements

This study has no need for environmental monitoring requirements; the RAP Steering Committee and MOE/DOE management will be briefed on the study progress and outcome.

### Reporting

The contractors will submit interim/progress reports in addition to a final report which will be available for distribution to RAP participants.

### Implementation

The RAP Steering Committee may make recommendations for action on funding mechanisms as a result of this study. Agency adoption and implementation of such recommendations will be subject to management review and approval where appropriate. Involvement and commitment of other agencies and parties will be sought subject to necessary agency approvals in principle.

### Potential Delays

No significant delays are foreseen in the execution of this consulting assignment.

Delays may be encountered in obtaining the necessary political and institutional support for innovative solutions and/or significant augmentation of resources dedicated to RAP

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implementation. Delays may also be encountered in establishing the necessary legal and administrative mechanics to support implementation of new mechanisms.

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### Summary Information for Implementation

Component Action:	Funding Mechanisms Study
Priority of Remedial Intent:	
Priority of Component Action:	High
Related Programs/Projects:	all
Implementation Responsibilities:	Variable depending on Study outcome
Funding Responsibility:	COA RAP Budget (study only)
Additional Costs Range:	
Monitoring Requirements:	None
Reporting Requirements:	Final consulting report
Timeframe:	May - July 1990
Potential for Delay:	Low
Potential Reasons for Delay:	Inadequate proposals

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### Reference Documents

Terms of Reference: "Assessment of Existing and Potential Funding Mechanisms for Implementation of Canada/Ontario Remedial Action Plans". March, 1990. Water Resources Branch, Ontario Ministry of the Environment. Toronto.

### COMPONENT ACTION # 7.1.6: Long term Fish Community Monitoring Along the Toronto Waterfront

The fish community in a given area is a good indicator of the quality of the aquatic environment in that location. It is important to be able to discern changes in the community due to natural effects from changes due to the RAP measures. Previous studies along the Toronto waterfront have identified the fish species which comprise the fish community at different locations. However, information is lacking in such areas as:

- population dynamics of the fish community
- spawning sites for various species
- current reproductive success of individual species

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A comprehensive monitoring program would fill these knowledge limitations and allow the fish community to become a useful and valuable indicator of the progress of the Remedial Action Plan.

### Existing Programs

Metro Toronto Region Conservation Authority conducts waterfront fisheries surveys to monitor any changes or effects due to landfill activities.

Ministry of Natural Resources conducts creel surveys and does sporadic habitat or fisheries inventories related to the Urban Fishing Program. In addition, fish are collected annually and tissue samples sent to Ministry of Environment for contaminant analysis.

In 1989 the Metro Toronto RAP undertook two studies to expand the existing database on fisheries.

### **Fish Habitat Evaluation only**

This project was undertaken to identify critical fisheries habitat at a number of sites in 1989. It is intended to repeat the assessment of these habitats in 1994 after RAP measures have been implemented. This project had a budget of \$ 33 K in 1989.

### **Fish Community Evaluation**

In addition to the habitat study, a five year study of the fish community dynamics, including species present, age composition, reproductive success, diet and species interactions was initiated at a number of sites in 1989. The budget for this project was approximately \$60 K.

The above two projects will be carried out at:

1. Marie Curtis Park - Etobicoke Creek
2. Colonel Sam Smith Park
3. Humber Bay West
4. Humber Bay East
5. Humber River Estuary
6. Toronto Islands
7. Tommy Thompson Park
8. Ashbridges Bay
9. Scarborough Bluff's Park
10. Highland Creek
11. Rouge River Marsh and Estuary

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### Potential Program Improvement

Valuable information was obtained during the 1989 studies. The work completed has been used in support of a reef placement project proposed for the 1990 Toronto RAP workplan (item 1b) and an array of projects submitted to the committee working on the Canada Ontario Memorandum of Intent for Great Lakes Rehabilitation.

The 1990 RAP workplan includes a proposal for continuation of the fish community work (item 5a).

### Potential Program Benefits

- establish a baseline against which changes in the fish community due to RAP measures can be evaluated
- identify critical components of fish habitat which may need to be rehabilitated in order to allow the fish community to respond to improved water quality

### Dependent Projects

None.

### Monitoring Requirements

The Fish Community Survey should be conducted annually for a five year period. The Fish Habitat Study should be conducted in 1989 and repeated in 1994.

### Reporting

A report will be generated each year on the field activities conducted. An overview report will be generated at the end of the five year study. The results of the studies will be summarized in the RAP annual report as they become available.

### Implementation

The projects are under way. Ministry of Natural Resources and MTRCA are working cooperatively on the projects and are to coordinating with other projects along the waterfront.

### Potential Delays

The projects are under way but a subject to budget review in each fiscal year.

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### Summary Information for Implementation

Component Action:	Long Term Fish Community Monitoring
Priority of Remedial Intent:	
Priority of Component Action:	
Related Program/Projects:	none
Implementation Responsibility:	MNR/M.T.R.C.A.
Funding Responsibility:	RAP; MNR in future
Additional Costs Range:	1989 - \$ 93 K
	1990 - \$ 50 K (proposed)
	1991-93 - \$50 K annually
	1994 - \$ 95 K
Monitoring Requirements:	project specific
Reporting Requirements:	Annual Reports
Timeframe:	1989 - 1994
Potential for Delay:	Low
Potential Reasons for Delay:	lack of resources

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### COMPONENT ACTION #7.1.7:      Monitoring of Airborne Toxic Chemicals

There is very limited data available concerning atmospheric deposition of toxic substances, especially organics, in the Toronto area. Data on this source type is needed as input to models which predict improvements based on remedial actions.

Monitoring of a site at the water treatment plant on the Toronto Islands was commenced in 1988 to determine concentrations of selected toxic species in both air and precipitation. From the concentrations in precipitation and the total precipitation depth the wet deposition flux may be calculated directly. For those airborne species for which a deposition velocity may be estimated the dry deposition flux to the surface can also be inferred.

The objectives of the monitoring program are:

1. To determine the concentrations in air and precipitation of selected organic compounds (HCB, alpha- and gamma-BHC, PCB, DDT, DDD, DDE, aldrin, alpha- and gamma-chlordane, dieldrin, endosulfan, heptachlor epoxide and mirex) and metals (manganese, nickel, zinc, iron, lead, vanadium, aluminium, copper and cadmium).

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2. To calculate, where possible, wet and dry deposition fluxes of these chemical species to the Toronto waterfront area.
3. To provide these data in a form suitable for input to the modelling of the fate and transport of toxic species.

The monitoring site will be operated according to the protocol of the Ontario Toxics Deposition Monitoring Network, and it will thus be possible to make direct comparisons with concentrations and deposition values determined at the other sites. These other sites are all in rural locations.

### Existing Programs

Equivalent monitoring is carried out at the six sites of the Ontario Toxics Deposition Monitoring Network. All other sites are located in rural areas. Discussions are currently in progress in accord with Annex 15 of the Great Lakes Water Quality Agreement to integrate this network with monitoring activities carried out by Canadian and U.S. Federal agencies.

In late 1989, the RAP's working agreement with Air Resources Branch of Environment Ontario expired and the equipment was to be relocated to another priority site. The Metro Toronto RAP, recognizing the need for continuing research in this arranged to acquire the station for permanent use in the RAP program. The 1990 RAP workplan contains a proposed allocation for continued sampling (item 3).

### Potential Program Improvements

The network QA/QC program is in place and will be formally documented during 1990. Additions to the list of target compounds are being considered. It is hoped that selected PAH and heavily used agricultural chemicals such as Atrazine can be included. However, these additions are dependent on the availability of suitable analytical methods and laboratory capacity for the additional sample load.

### Potential Program Benefits

This study will allow the direct input of toxic species from the atmosphere to the water surface to be quantified.

### Dependent Projects

Fate and transport modelling study.

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### Monitoring Requirements

Not applicable.

### Reporting

Data reports will be issued annually, approximately one year after the end of the period being reported.

### Implementation

The monitoring equipment is in place and operating.

### Potential Delays

Release of data could be delayed by delays within the laboratory or as a result of problems within the Ministry's Corporate Data Base (SIS - the Sample Information System).

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## SUMMARY INFORMATION FOR IMPLEMENTATION

Component Action:	Monitoring of airborne toxic chemicals
Priority of Remedial Intent:	
Priority of Component Action:	
Related Programs/Projects:	Fate and Transport Modelling
Implementation Responsibility:	MOE, Air Resources Branch
Funding Responsibility:	RAP
Additional Costs Range:	1990 - 50k (proposed)
Monitoring Requirements:	Not Applicable
Reporting Requirements:	Annual data reports
Timeframe:	Monitoring under way
Potential for Delay:	Moderate
Potential Reasons for Delay:	Laboratory delays

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### REMEDIAL ACTION #7.2:

Complete Studies Initiated as a Result of Other  
Programs Which Will be of Assistance to RAP  
Implementation or Decision Making

Several programs which have a bearing on the Toronto RAP process but which have been initiated under other provincial programs are outlined in the component sections 7.2.1-7.2.4. Information on the status is given.

### COMPONENT ACTION # 7.2.1:

Municipal Industrial Strategy for Abatement (MISA)  
for All Sectors

In recognition of the value of our unique water resources the Ministry has developed the MISA Program. Municipal and Industrial Strategy for Abatement (MISA) is a new Ontario initiative to reduce water pollution from industrial and municipal discharges. The ultimate goal of MISA is the virtual elimination of persistent toxic contaminants from all discharges into Ontario waterways.

The program involves direct dischargers to the Ontarios' waterways and is divided into nine industrial sectors and the municipal sector. The Industrial Sectors are Petroleum, Organic Chemical, Iron and Steel, Mining, Pulp and Paper, Inorganic Chemicals, Metal Casting, Electrical Power and Industrial Minerals. The Municipal Sector deals with both direct and indirect dischargers. The direct dischargers will be regulated through the Sewage Treatment Plant Regulation. The indirect dischargers are those industries that discharge waste streams to municipal sewer systems. They will be uniformly regulated across the province through the Sewer Use Control Program and the Model Sewer Use By-Law (see Component Action 2.2.3).

Each sector will have a regulatory section under the Environmental Protection Act. The establishment and development of these regulations is being conducted through joint consultation with representatives of the respective industries. The regulations will be promulgated in two parts. The first regulation is the Monitoring Regulation with a duration of one year, followed by the Limits Regulation.

Under MISA monitoring regulation, dischargers must measure the types, concentration and total amounts of toxic substances in their effluent. Audits by the Ministry will ensure that this information is accurate and reflects actual operating conditions in plant. This comprehensive data base of information will be used to formulate the Limits in the Limits Regulation.

### Existing Programs

The Ministry presently regulates direct dischargers to surface water through Certificate of Approval (EPA), Control Order (EPA), Directors Program (OWRA), Permits to Take Water

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(OWRA) and site specific regulation (EPA). The total number of direct dischargers with in the RAP area is five. They are as follows:

Metal Casting	Acustar Canada Inc.	Etobicoke
Electric Power	R.L. Hearn TGS	Toronto
Electric Power	Pickering NGS A	Pickering
Electric Power	Pickering NGS B	Pickering
Electric Power	Lakeview TGS	Mississauga

The indirect dischargers are those that discharge to a sewer collection system for treatment at a Sewage Treatment Plant and ultimate discharger to surface water. Estimates of the total number of indirect dischargers in Metro alone are nine to eleven thousand.

The monitoring regulation will have a one year duration with cost estimates for the various sectors varying up to 29 million dollars. The monitoring requirements are sector specific and reflect the nature of the pollutant discharges from the particular sector. The ministry has developed a listing of environmentally significant pollutants called the Effluent Monitoring Priority Pollutants List (EMPPL).

The ministry has produced over forty MISA and related documents. These documents are available to the public through our Communications Branch located at 135 St Clair Avenue West in Toronto or by calling the information number (416) 323-4321.

### COMPONENT ACTION # 7.2.2:

### Complete MISA Pilot Site Study of the Main STP

The Toronto Main STP is the subject of a MISA pilot study which addresses the impact of the Toronto Main STP on the adjacent nearshore and derives effluent limits based on receiving water considerations. The study is being finalized and a report should be available in 1990. This study has considered the numerous effects of the STP discharge on the adjacent nearshore and consists of the following components:

- mutagenicity testing
- acute toxicity
- chronic toxicity
- modelling (fate and transport)
- sediment bioassays
- in-place pollutants (sediment contamination)
- sediment trap and clam/leech exposure
- in-situ bioassays (bioaccumulation)
- spottail shiners (bioaccumulation)
- phytoplankton bioassays
- water quality (chemistry)

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Effluent limits will be suggested based on findings of receiving water considerations.

### Existing Programs

Monitoring of water quality, sediments and biota is an ongoing activity carried out by MOE and aimed at addressing the contaminant status of the Toronto waterfront. The MISA pilot study has focused on the effects of the Main STP.

The current study will identify impairment associated with the Main STP discharge as well as establish effluent limits based on receiving water quality considerations. Monitoring for this study is complete. The experience gained during this study will be used to assist in the design of a long term monitoring program to gauge progress under the RAP. It is anticipated that the MISA pilot site report will be available in the summer of 1990.

### COMPONENT ACTION # 7.2.3:

#### Development of Contaminant Residue in Biota (CRAB) Guidelines

There is considerable concern over the accumulation of trace contaminants in aquatic biota. The Ministry has had a contaminant in sportfish monitoring program since the early 1970's and has monitored contaminants in juvenile fish since the mid 1970's. More recently, other biomonitors (clams, leeches, benthos) have been used to monitor contaminants in the aquatic environment. However, very little information exists as to the significance of the contaminant residues to the biota themselves or their predators. For example, what is the significance of a young fish having a 100 ppb PCB residue? How does it affect the fish itself or other fish that consume it? To provide some answers to these issues and to provide guidance to interpreting the significance of contaminant residues in biota, the Ministry (Water Resources Branch) has initiated the development of CRAB guidelines. The CRAB guidelines will be a set of numeric and narrative guidelines that define allowable concentrations of contaminants in aquatic biota which will protect against harmful effects to an organism and its predators, excluding man.

Currently, the Ministry has no such guidelines and uses the guidelines of other agencies to aid in interpretation of contaminant residue information. The IJC and, more recently, the New York State Dept. of Environmental Conservation have developed CRAB type guidelines (Newell *et al.* 1987). However, their guidelines apply to a relatively small number of chemicals and neither agency is actively developing additional guidelines at this time.

CRAB guidelines are not intended to be applied to contaminant in sportfish data for advising the public on the suitability of consuming the sportfish. Sportfish consumption advisories for people are developed primarily by medical experts at Health and Welfare Canada.

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### Existing Programs

Currently, the lead in developing the CRAB guidelines lies with the Watershed Management Section of the Ministry. The Aquatic Criteria Development Committee (ACDC) is charged with co-ordination in setting aquatic environmental criteria (water, sediment and biological criteria). A subgroup of the ACDC is charged with the development of CRAB guidelines and the lead scientist is in the Watershed Management Section. A review of available information applicable to setting CRAB guidelines has been completed and work has commenced on deriving a method to set the guideline values. A draft set of procedures should follow by the autumn of 1990. Resources committed to the task are 0.4 man years of the lead scientist's time, review by the ACDC and subcommittee and about 10 K in FY 1990/91.

To improve this program, research addressing the effect of contaminant residues on biota and their predators is needed. A multiyear research effort in lab and field would be needed to generate the required information.

Successful completion of the program would result in a set of contaminant biota guidelines. These CRAB guidelines would aid in the interpretation of MOE data on contaminant levels in biota. The guidelines would be a yardstick, useful in deciding what levels of contaminants are unacceptable in biota. As such, they could be used to identify areas where remedial action is necessary. Ultimately, they could be used in conjunction with contaminant fate and transport models to decide what levels of contaminants in effluent discharges would lead to unacceptably high contaminant accumulations in fish, benthos and other types of biota.

The development of CRAB guidelines, sediment quality guidelines and provincial water quality objectives/guidelines (PWQO/G) are all linked. CRAB guidelines will be used as one line of evidence in setting PWQO/G and sediment guidelines as well.

Work on the CRAB guidelines is reported in progress reports (often verbal) to the ACDC. The literature review is now available as a consultants report. The method of setting CRAB guidelines and ultimately the guidelines themselves will be peer reviewed and available to the public.

The schedule for development of the CRAB guidelines is tentative and dependent in part on available data. Milestones are:

Fall 1989:      Review of literature pertinent to setting CRAB guidelines completed.

Fall 1990:      Draft methodology for setting CRAB guidelines available.

Regular intervals thereafter: CRAB guidelines set for substances with sufficient available data.

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### Reference Documents

Newell, A.J., Johnson, D.W., and L.K. Allen. 1987. Niagara R. Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife. New York State Dept. of Environmental Conservation.

### COMPONENT ACTION # 7.2.4: PWQO Revisions (Chemical and Toxicity)

The Provincial Water Quality Objectives (PWQOs) are a set of numerical and narrative ambient water quality values for the protection of aquatic life and recreation. The Objectives are designed to protect all stages of aquatic life cycles during indefinite exposure to the water. Where insufficient data are available to meet the requirements for setting a PWQO, a Provincial Water Quality Guideline (PWQG) may be set instead.

Since 1978, Ontario has relied on PWQOs as principal tools for surface water quality management. The PWQOs are used in a number of ways by the MOE. They are often the starting point in deriving waste effluent limits for new or expanded point source discharges, and for evaluating the impact of non-point sources and spills. PWQOs are also an important factor in the development of limits for contaminants in sediments and fish.

More recently, the PWQOs have taken on an added importance in support of the MISA program. They have been used as a guide for the development of the MISA monitoring regulations, and will be used as input to the future development of the MISA effluent limit regulations and in defining what constitutes virtual elimination.

### Existing Programs

The PWQOs have been subject to continual review and revision; this process has taken on an added urgency under MISA. Efforts are currently under way to develop new or revised PWQOs for all substances on the MOE 1987 Environmental Monitoring Priority Pollutants List (EMPPL) by 1991.

At present, there are a total of 82 PWQOs and PWQGs, including 49 for EMPPL substances. Projects are currently under way to develop PWQOs or PWQGs for an additional 94 substances during FY 1989/90 and for the remaining 46 substances on the 1987 EMPPL the following year (see attached list).

To support this activity, a systematic process for development of PWQOs and PWQGs has been prepared. A draft document, titled: "Ontario's Water Quality Objective Development Process" is currently undergoing peer review and is being used on a trial basis. The document describes in detail the procedures followed in PWQO development. It notes that the major factors involved in establishing PWQOs include:

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- toxicity to aquatic life (acute, chronic, lethal, sublethal);
- bioaccumulation (human health via fish consumption, wildlife);
- mutagenicity to aquatic life;

while other factors which are also considered include:

- fate and physical/chemical factors
- sources and ambient levels
- taste, odour and tainting of fish and water
- impacts on wildlife
- recreation (bathing and aesthetics)
- sediment quality
- standards of agencies.

With an ever increasing number of PWQOs and PWQGs, there is a growing appreciation that possible additive or antagonistic effects are making it difficult to deal with complex discharges on a chemical-specific basis. Consequently, related work is currently under way to develop and apply a variety of biomonitoring and toxicity testing techniques to whole effluents.

The PWQO development activity has involved a significant expenditure of dollar and manpower resources. To date, the task of developing PWQOs and PWQGs in support of MISA has entailed 10 man-years and the acquisition of \$429 K in consulting services.

**APPENDIX A**

**Summary of Discussions**

**Seminar on  
Methods for Improving Water Resource Inputs  
to Planning Processes**

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This section deals with the proposed initiatives developed by the planning working group, established at the request of the TAC's Planning/Health Subcommittee, during a two-day seminar conducted in February 1990. Each of the initiatives are presented as draft recommendations for consideration by the PAC, the TAC and the public. The RAP will encourage adoption of these or other measures developed during subsequent discussions, by the responsible agencies.

The planning working group was asked to examine two basic questions relating to planning tools and initiatives:

What can be done at present, if existing tools are fully utilized?

What is needed beyond current capabilities, and what changes need to be considered, to facilitate improvement?

The context provided for the discussion was that the major RAP issues which could be effected by planning initiatives were: water quality (stormwater, sediment controls); resource protection (wetlands, aquatic habitat); and environmental opportunities (tree planting, wetland creation, runoff reduction). These issues provided the background for discussions.

The general consensus developed during the seminar was that there were some things that can be done to focus attention on RAP concerns. Focusing directly on the municipal planning process was considered to be insufficient however, to meet the needs of the RAP. A comprehensive approach to basin planning, separate from the municipal planning process but with clearly defined linkages, was considered to be the greatest need at the present time. Based on this conclusion the working group developed a hierarchy of options involving actions which could be taken immediately and those which are currently being developed or need to be developed. Taken as a whole, the options define a process which the working group feels should be pursued in order to achieve RAP objectives.

### **A. Endorsement of the need for Ecosystem Management**

The Public Advisory Committee (PAC) has established a set of goals for the Metro Toronto RAP which they have requested that all councils within the RAP area adopt. Several municipal councils have formally endorsed the goals in principle. The first goal states:

Toronto's waterfront and watersheds should be a diverse, healthy, integrated ecosystem. They should be managed using an ecosystem approach in order to restore beneficial uses of our aquatic resources. An ecosystem approach is a comprehensive and systematic consideration of the interacting components of air, land, water, and living organisms, including humans.

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All of the goals are important in defining the direction that the RAP should take. This first goal however, is particularly pertinent to planning and management. It should therefore be given special attention in municipal planning processes. It is therefore recommended that specific acknowledgement of this goal, with its' implicit requirement that the ecosystem outside of the political boundaries of the municipality be considered in local planning decisions be incorporated into the appropriate municipal plans. The specific wording used and the level of plan most appropriate (eg. Official Plan, Secondary Plan) will vary by municipality because of differences in form and application between municipalities.

The intent of this measure is to give clear notice of a municipality's commitment to consideration of issues effecting the greater ecosystem during local decision making.

### **B. Endorse the Need for the Development of a Comprehensive Resource Management Strategy Process**

The strongest emphasis of the working group was on the need to establish a process for the development of watershed management strategies. Such a process would involve resource management agencies, municipalities, non-government organizations and the public. The idea is not new. The TAWMS studies conducted during the 1980's were the beginnings of this approach in the Toronto region. MTRCA's Rouge River Strategy may be considered as a possible prototype of such a process. Environment Ontario and the Ministry of Natural Resources have been conducting staff level discussions on basin planning initiatives.

The discussions among the working group made it clear that a top-down initiative is required, with provincial agencies taking the lead in establishing the process. The example of flood control was cited as one process which works well. The success of this program was attributed to clear direction from the province in the form of policy statements and a clearly defined mandate to Conservation Authorities for implementation. Municipal authority under the planning act was seen as an important delivery mechanism for the overall process.

The historic emphasis in watershed planning initiatives has been on water quantity. This is insufficient. Within the RAP context there is a need to define a process that also looks at water quality and aquatic resources. Beyond the specific RAP concerns, there is a need to consider all resources, on a watershed basis. What is needed is a comprehensive resource management strategy for individual watersheds.

A skeleton of what might be involved in a process for comprehensive resource management strategies is provided below, for illustrative purposes. It is expected that this approach, if endorsed by the RAP and the agencies involved in resource management, would become the responsibility of a task force of agency representatives, who would define the specific process to be followed and the actions to be taken.

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### 1. Develop Provincial Direction for Completion of Comprehensive Resource Management Planning on a Watershed Basis.

The province should establish a strong basis for resource management planning using the watershed as the basic planning unit. This would require the development of provincial direction through policy statements or other mechanisms, identification of implementation and funding responsibilities, and allocation of the provincial resources necessary for implementation.

### 2. Establish Guidelines for the Development of Resource Management Plans

The guidelines should specify the lead agency, other resource agency and municipal involvement and opportunities for involvement by public interest groups. It should indicate the issues to be addressed. Based on examples of recent work by MTRCA (eg. the Rouge Strategy, Oak Ridges Moraine interim planning guidelines) the following components could be included as elements of a resource management plan.

- a) Water Management Component
  - o Water Quality
  - o Water Taking/Water Supply
  - o Fisheries
  - o Wetlands
  - o Aquatic Habitat
- b) Environmental Management Component
  - o physical features
  - o major resources (wetlands, ANSIs, ESAs, Riparian Habitat Zones)
  - o open space linkages

Under each component of the Resource Management Plan it would be necessary to conduct inventories, assess potentials, develop targets and objectives for preservation, protection and enhancement, on a watershed basis. The guideline should identify the need to specify municipal policies on a subwatershed level so that a linkage can be made between the Resource Management Plan and individual Official Plans. Municipalities should be requested to reflect the direction provided by the watershed Resource Management Plan at the appropriate levels in their planning documents and process.

A key element of the Water Management Component is the development of Master Drainage Plans (MDPs). Guidelines currently exist for the development of MDPs but they are oriented primarily to quantity control of surface water resources. The guidelines should be expanded to include consideration of water quality, groundwater, fisheries and wetland concerns. MDPs should be completed at a subwatershed level and should be completed prior to approval of municipal official or secondary plans. A corresponding level of plan should be

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prepared to address the Environmental Management Component. In the absence of policies on a subwatershed level, the requirements of the Resource Management Plans should be met at a local level as a part of site plan or subdivision approval.

### **3. Establish Guidelines for Development of Detailed Management Plans**

The application of the watershed Resource Management Plan at a local level should involve stormwater management plans and resource conservation plans. These plans must be consistent with the watershed Resource Management Plan and must provide sufficient detail for use in the municipal subdivision and site plan approval processes. Of particular importance to this level of plan is the development of technical guidelines (by the province), such as the Interim Stormwater Quality Control Guidelines. Guidelines should specify numerical criteria, or the methods to be used in developing site-specific criteria. Technical guidelines could include recommended setbacks, riparian buffer distances, infiltration targets, temperature and water quality targets among others. Guidelines should also be available for enhancement opportunities, including plantings for stream shading and stream habitat improvement.

Development of a process for Comprehensive Resource Management Plans on a watershed basis would be the primary responsibility of those agencies with resource management mandates (the Conservation Authority, Ministry of Natural Resources and Environment Ontario). During the actual development of the actual plans it is important that there be both municipal and public involvement. The results of the plan development at all levels must feed into the municipal planning process to ensure that environmental issues receive attention at each phase of the municipal planning process.

### **C. Incorporate a Series Of Interim Statements in Appropriate Planning Documents**

The development of comprehensive resource management strategies for each river basin will provide specific direction and targets which can be incorporated into the appropriate plans and agreements. There are however, six watersheds within the RAP area as well as the lakefront. Development of the Rouge Strategy took three years. Although much background work has been completed on the Don and Humber watersheds, and it is anticipated that the development of future strategies will require less time, the strategies will not be immediately available. There are certain principles that would be expected to be included in any strategy however. As an interim measure, pending the availability of more detailed numerical guidelines specific to the particular watershed, consideration should be given, by municipalities, to incorporating the following statements into appropriate planning documents, and more importantly into the plan review and approval process.

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- o streams and adjacent riparian habitat should be retained in a natural state
- o on-site infiltration of runoff should be maximized
- o sensitive aquatic ecosystems identified by MTRCA or MNR should be maintained and protected
- o retained stormwater, discharged under dry weather or baseflow conditions, should not reach temperatures which could impair the fishery
- o sediment loss from the site should be minimized, both during and after construction
- o storm sewer infrastructure design should incorporate spill control devices where appropriate to the type of land use
- o the number of storm sewer outfalls should be minimized and sited to avoid impact on sensitive aquatic environments

Many of these statements are endorsed by agencies and included in existing plan review and comment processes. The intent in seeking to incorporate them in the municipal planning process is to ensure that each is addressed by municipal staff during the review of development applications.

### **D. Request Consideration of Legislative Changes Which Would Facilitate Inclusion of Environmental Clauses in Development Agreements**

The two most important issues in dealing with RAP concerns with respect to the planning process are:

the need to develop a commitment to consider the cumulative effects of decisions on an ecosystem basis; and

the need to develop a mechanism for addressing the issues that extend beyond political boundaries or the boundaries of specific developments

Provincial direction would be extremely useful in this regard, and this is the intent of options A and B. There are actions which could be taken however, to facilitate current municipal efforts to address environmental issues.

Discussions at the Planning/Health subcommittee level and within the working group all indicated that in general, the RAP municipalities seek to use the legislative tools provided under the Planning Act to address environmental concerns. The main sections of the Act cited as being sufficient in this regard include:

- o Section 50(6) - subdivision agreements
- o Section 44(9) - minor variance agreements
- o Section 52(2) - severance agreements
- o Section 36(3) - rezoning agreements (applicable to height or density increases only)

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Agreements concluded between the municipality and the owner under these sections are not limited to specific issues and so may include environmental concerns. In each case the agreements concluded would be binding on subsequent owners.

In many cases, especially for new development these sections will be sufficient. In some cases however, especially where no subdivision agreement is required, municipalities are not in as strong a position. For example, neither Section 17 nor 34 of the Act contain provisions authorizing municipalities to enter into agreements as a condition of rezoning or official plan amendment. Section 35 (holding symbol) similarly contains no provision for agreements as a condition of holding symbol removal. Section 40, does allow for agreements, but only for specific things. While many of these are useful to the municipalities in pursuing RAP-related objectives (eg. disposal of storm, surface or waste water; landscaping; easements) the limitations imposed by the legislation sometimes reduce the municipality's ability to secure environmental agreements.

In some cases, municipalities currently work outside of the Planning Act in order to secure environmental agreements. This is particularly true in re-development situations. In the case of the Railway Lands in the City of Toronto, private legislation was enacted to authorize such agreements, because of the limitations under Section 35. Some municipalities use collateral agreements with developers to cover environmental matters because of the limitations in Sections 34 and 40. These agreements are useful in the short-term, but may not be binding on future owners.

In general, the positions taken by councils were deemed to be more important than the availability of legislative tools. Improvements could be made to sections of the Planning Act however, which would facilitate municipal efforts to require agreements regarding environmental issues. The improvements noted at the working group level included:

- o Section 34 (zoning by-laws) could be amended so as to authorize agreements between the municipality and the owner (to be binding on future owners)
- o Section 35 (holding symbol) could be similarly amended
- o Section 40(7)(a) (development control) could be amended to include additional environmental issues

Municipal representatives on the working group felt that such changes could improve upon the current situation. It was not felt that such changes would lengthen the planning process because in most instances municipalities seek alternative means of requiring agreements if authority is not available under the Planning Act.

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### Potential Benefits

The process discussed is intended to improve environmental input to existing planning processes, to encourage planning on an ecosystem basis within the basic physical element of the watershed, and to assist municipalities in their efforts to implement environmental conditions in development agreements. Water quality and preservation of aquatic resources cannot be ignored in land use planning if the goal of sustainable development is to be achieved. Incorporation of resource management issues into the overall planning process will allow development to become a catalyst for improvement of the aquatic ecosystem.

### Implementation

If endorsement of the proposed improvements is received through discussions under the RAP, it will be recommended that the options be pursued by the appropriate agencies. The responsibility for implementation will reside with those agencies or jurisdictions with authority applicable to the particular option.

The resolution of conflicts in mandate between the various resource agencies may result in delays. In addition, depending upon the final form of the proposed process and linkages to municipal planning, substantial staff resources could be required by particular agencies. There will be a reluctance for any agency to commit to the process without clearly identified resources.

**APPENDIX B**

**Summary Charts for Remedial Intent 1-7**

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**Remedial Intent # 1**  
Implement Specific Plans to Correct Localized Use Impairments

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 1.1 : Continue Implementation of Projects Under Way								
1.1.1 (pg. 1-3)	Eastern Beaches Tanks	Toronto	Toronto MOE	Phase 1 (2250 m3 tank) underway	\$ 4.4 million	Phase 2 (16,000 m3 tank) scheduled for 1992	\$ 10 million	- Subject to Class EA - Project dependent upon Main STP expansion
1.1.2 (pg. 1-6)	Staged Diffuser	Toronto	Toronto MOE	on hold	---	Phase 1 (staged diffuser) Phase 2 (re-circulation)	\$ 1.0 million \$ 0.6 million	- Subject to Class EA - MOE has withdrawn funding support
Remedial Action # 1.2 : Initiate Implementation of Projects Which Have Been Previously Recommended								
1.2.1 (pg. 1-9)	Western Beaches Remediation	Toronto Metro	Toronto Metro MOE	Preliminary Studies Completed	---	see other component actions  sealing breakwell and treatment CSO and storm retention	---  \$ 30-75 million see Component Action # 2.2.1	- remediation requires large scale action - conceptual proposal only - dependent upon: STP capacity and CSO policy
Remedial Action 1.3 : Continue Special Provincial Funding Programs to Encourage Implementation of Water Quality Improvement Projects								
1.3.1 (pg. 1-16)	WWQIP	MOE Mun.	MOE Mun.	Existing (Metro mun. only)	variable \$ 50 M (1984-1988)	Expand Scope to Regions	not costed	- 50/50 funding program applicable to Metro municipalities only - expansion to regions may reduce funds available to Metro
1.3.2 (pg. 1-24)	Lifelines	MOE Mun.	MOE Mun.	Existing	variable	Deferred pending completion of Component Action # 7.1.5	---	- program applicable to entire province
Remedial Action 1.4 : Continue Enforcement and Development of Lakefilling Controls								
1.4.1 (pg. 1-31)	Lakefill Quality	MTRCA MOE	Self Supporting	Existing (new program begun in 1989)	\$ 415 K (1989)	Revise Fee Structure Increase Inspection Improve Operational Efficiency Increase Education Operational Research Upgrade Equipment	0 0 not costed not costed \$ 100 K \$ 50 K	- New programs initiated in 1989  - Program designed to be self-supporting; costs provided do not include increased costs to users
1.4.2 (pg. 1-39)	Lakefill Policy	MOE	MOE	Under Development	---	Deferred pending release of discussion paper on policy	---	- policy development to receive public input
1.4.3 (pg. 1-44)	Dredge Spoil Disposal	MOE	MOE	Guidelines exist (1976 version)	---	Update Handbook	---	- revised handbook expected in 1990
1.4.4 (pg. 1-47)	Contaminated Sediments	MOE	MOE	Underway	---	Remedial measures to be developed after sediment quality guidelines finished; Emphasis for now on control of sources.	---	draft sediment Quality Guidelines in 1990

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**Remedial Intent # 2**  
Reduce the Impacts of Treated and Untreated Sanitary Sewage

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 2.1 : Expand and Improve Sewage Treatment Plants								
2.1.1 (pg. 2-2)	Main STP Improvements	Metro	Metro Province	Five year plan -Efficiency -Capacity reserve development -Regulatory -Other TOTAL	(1989-1993) \$ 44.6 mill.  \$ 73.9 mill. \$ 41.6 mill. \$ 86.4 mill. \$ 43.8 mill. \$ 290 mill.	Future Plans beyond 1994  Completion of projects Secondary treatment expansion Tertiary treatment (if required) Other  TOTAL	\$ 93.5 mill. \$ 325 mill. \$ 474 mill. \$ 238 mill.  \$ 1.13 billion	Class EA for expansion underway  Expansion requires lakefilling  Expansion necessary if treatment of CSO or retirement of North Toronto STP to be considered  Metro has assumed 33% provincial grant in budgeting (all STPs)
2.1.2 (pg. 2-21)	Humber STP Improvements	Metro	Metro Province	Five year plan -Efficiency -Capacity Reserve -Other TOTAL	(1989-1993) \$ 26.8 mill.  \$ 21.4 mill. \$ 7.0 mill. \$ 55.2 mill.	Future plans beyond 1994  Completion of projects Tertiary Treatment(if required)  TOTAL	\$ 82 mill. \$ 89 mill.  \$171 mill.	expansion subject to Class EA  expansion does not require lakefilling  expansion required if CSO treatment is to be considered
2.1.3 (pg. 2-27)	Highland Creek STP Improvements	Metro	Metro Province	Five year plan -Efficiency -Capacity reserve -Other TOTAL	(1989-1993) \$ 0.5 mill.  \$ 34.9 mill. \$ 31.8 mill. \$ 67.3 mill.	Future plans beyond 1994  Completion of projects Secondary treatment expansion Tertiary treatment (if required) Other TOTAL	\$ 35.6 mill. \$ 34.3 mill. \$ 38.8 mill. \$ 27.1 mill. \$ 135.2 mill.	expansion subject to Class EA  expansion does not require lakefill  no CSO treatment issue
2.1.4 (pg. 2-34)	North Toronto STP Improvements	Metro	Metro Province	Physical audit Underway	average of \$500K/yr for equipment replacement	Close plant and divert to Main STP (under study)*  Upgrade to tertiary treatment(if not taken out of service)*	\$ 50.0 mill.  not costed	retiring plant would require expansion of trunk sewers and Main STP  Impact of plant on Don River is significant in dry weather, but not in wet weather (when runoff dominates)

**DRAFT**  
**Remedial Intent # 2**  
Reduce the Impacts of Treated and Untreated Sanitary Sewage

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 2.2 : Reduce Sanitary Discharges from Storm Sewer Outfalls and Overflow Points (CSO)								
2.2.1 (pg 2-40)	Virtual Elimination of CSO	Metro Toronto East York York Scarborough	Metro Province Toronto, East York, York, Scarborough	Ongoing sewer separation	City of Toronto (1966-1983): \$182 million  All Cities (1984-1989): \$ 29 million	Implement Metro's draft CSO Policy (over 20 years)  Humber system  Don system (includes lakefront)  TOTAL	\$ 60.1 million  \$ 319.5 million  \$ 390 million	MOE has designated sewer separation a low priority for enhanced funding (low water quality benefit)  tanks subject to Class EA  implementation requires \$65 mill. expansion at Humber and \$89 mill. expansion at Main STP in addition to these costs  assumes average control of 1 overflow per year  CSO control alone will not be sufficient to open most beaches; Toxic load quantification underway
2.2.2 (pg. 2-50)	Illegal Sanitary Connections	Local Mun.	Local Mun. Province	Ongoing programs since 1984 (inside Metro)	Metro mun. \$ 285 K (1988)	Complete and terminate existing program inside Metro*  Extend to Regions (1 cycle only)*  Extend (continuing 10 year cycle)*  All Properties checked (20 yr cycle)*  Inspection as condition of sale*	\$ 9.6 mill. (over 34 years)  \$ 21.8 mill. (over 20 years) \$ 21.8 mill. (over 10 years) \$ 63.1 mill. (over 20 years) \$ 17.2 mill. (over 10 years)	existing programs have low cost effectiveness (\$19,000/connection remedied in 1988)  programs will remove sources of human pathogens, but in most cases will be insufficient to open beaches  Enhanced funding (WWQIP: 50/50) applies only to Metro at present
2.2.3 (pg 2-64)	Sewer Use By-Laws	Reg. Mun. Local Mun. MOE	Reg. Mun. Local Mun.	Revised By-law being adopted	1988 Durham: 158 K Metro: 863 K Peel: 860 K York: 60 K	Increase Regional Enforcement ). Increase Local Mun. Enforcement)  Full By-Law Enforcement*	\$ 907 K/yr \$ 450 K/yr  \$ 4.9 mill/yr	interim measure pending MISA sewer use regulations  source control aimed at reducing load of toxics to environment  see also Component Actions # 3.1.1, 3.1.2, and 3.1.3

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**Remedial Intent # 3**  
Reduce the Impacts of Dry Weather Sources

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 3.1 : Reduce Loads From Industrial Dry Weather Sources								
3.1.1 (pg. 3-1)	Illegal Industrial Connections	Reg. Mun.	Reg. Mun. MOE	Underway in Metro	\$ 266 K (Metro 1990 budget)	Priorize remaining sewer outfalls  Extend Trace & Disconnect Programs to the Regions*  End-of-Pipe Audit Sampling*  Automatic Sampling*	see Component Action # 2.2.2  \$700 K over 5 years  \$258 K/year  \$235 K/year	\$1.3 million noted under Improvement C  includes current Metro spending
3.1.2 (pg 3-9)	Spills Response	Reg. Mun. Local Mun. MOE	Reg. Mun. Local Mun. MOE (Spills Action Centre)	Existing but variable capability	Estimates: Durham: 90K/yr Metro: 600K/yr Peel: 160K/yr York: 96K/yr	Designated Response Staff  Implement Model Sewer Use By-Law  Develop Spills Response Program	\$ 0  see Component Action # 2.2.3  \$ 100K	Existing staff used; training increased through MOE programs  Consultant study under way
3.1.3 (pg. 3-16)	Industrial BMPs	Reg. Mun. MOE	Reg. Mun.	Existing by-laws being revised	not available	Pilot Project (1990)	\$ 150K consultant study	joint Metro/MISA project  most mun. are adopting revised by-law requiring industrial BMPs
Remedial Action # 3.2 : Reduce Loads from Residential Dry Weather Sources								
3.2.1 (pg 3-23)	Household Hazardous Contaminants	Reg. Mun.	Reg. Mun.	Existing (1989 programs)	Durham: 60K Metro: 1200K Peel: 500K York: 0	Expand programs in Durham and York Regions	Durham:\$315K/yr York: \$390K/yr	Programs expanding in Peel and Metro; emphasis on permanent drop-off facilities and residential pick-up service (in Metro)
Remedial Action 3.3 : Reduce Loads From Agricultural Dry Weather Sources								
3.3.1 (pg. 3-30)	Agricultural Dry Weather Controls	MTRCA OMAF MOE	OMAF MOE Reg. Mun. Local Mun.	OSCEPAP II (OMAF) Conservation Land Management (MTRCA) Rural Beaches (MOE)	- no estimate for RAP area  - variable  - \$ 225K (1986-1989)	Farm Remedial Action Plans  Improve Financial Assistance  Increase Education Develop Legislation Abatement	\$ 70 K/year for 5 years \$ 635-800 K (over 5 years) \$ 70 K/year \$ 200K/year* \$ 200k/year*	proposed increase in subsidy to 90% for a five year period; followed by enforced compliance through new legislation

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**Remedial Intent # 4**  
Reduce the Impacts of Stormwater Runoff

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 4.1 : Upgrade Municipal and Conservation Authority Best Management Practices								
4.1.1 (pg. 4-2)	Improved Catchbasin Cleaning	Local Mun. Regional Mun.	Local Mun. Reg. Mun.	Existing Maintenance Programs	\$ 1.4 mill/yr	Annual Cleaning of all CBs*  Annual + Selected Semi-Annual Cleaning*  Semi-Annual Cleaning*	\$ 241 K/yr  \$ 750 K/yr  \$ 2.1 mill/yr	cost are over and above existing program costs  goal is to maintain sump volume below 60% full; req'd frequency will be variable
4.1.2 (pg. 4-10)	Pet Control By-Law Enforcement	Local Mun.	Local Mun.	Existing By-laws	direct costs unavailable	Brochure/Public Information  Stronger Legislation	not costed  feasibility uncertain	programs ineffective in terms of water quality because of uncontrolled animal population
4.1.3 (pg. 4-14)	Sediment Control: Contruction Activities	Local Mun. MTRCA Province	Local Mun.	Guidelines Exist	---	Improve Enforcement Toughen Legislation Industry Education Improved Methods	\$ 200 K/yr --- --- ---	enforcement is inadequate and is the key required action; municipal responsibility for enforcement is important
4.1.4 (pg. 4-19)	Erosion Control	MTRCA	Province Municipality	Existing Program	\$ 6.9 mill. (1979-1989)	Increase funding for current priority sites  Target sediment generating sites  Eliminate private contributions  Use techniques which are more environmentally sensitive	\$ 500-700 K/yr  \$ 700-1000 K/yr  \$ 25-30 K/yr  project specific	Current program is aimed at hazard/damage reduction - not sediment reduction  Prioritization to target sediment control requires a new program  Small scale sediment control also addressed under Component Action 5.4.1
4.1.5 (pg. 4-25)	Improve Agricultural Controls	OMAF MTRCA	OMAF MTRCA MOE	see Component Action 3.3.1	see Component Action 3.3.1	Barnyard/Manure Storage System Improvements  Barnyard Water Diversion	\$ 2.1-4.3 mill. over 5 years  \$ 1.1-2.1 mill. over 5 years	see Component Action 3.3.1 for additional improvements and costs  Costs are over and above existing subsidy programs and assume proposed 90% funding

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**Remedial Intent # 4**  
Reduce the Impacts of Stormwater Runoff

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 4.2 : Implement River Basin Plans for Water Quality								
4.2.1 (pg. 4-36)	Humber River	Local Mun. Reg. Mun. MTRCA Province	Local Mun. Reg. Mun. MTRCA Province	Plan released in 1986; programs ongoing	refer to specific Component Actions	Upgrade plan to ensure consistency with other plans  Resolve proponentcy, ownership issues  Municipal-chaired Implementation Committee  Hire Individual River Basin Coordinators	no cost  resolved for Humber pilot site  Metro-chaired Committee formed  \$ 325 K/yr for 5 basin coordinators	improvements and costs are listed under Component Actions  Metro-chaired committee functions as a subcommittee of the RAP  Costs provided for basin coordinators are for entire RAP area
4.2.2 (pg. 4-47)	Don River	Local Mun. Reg. Mun. MTRCA Province	Local Mun. Reg. Mun. MTRCA Province	Strategy released Sept. 1989	refer to specific Component Actions	Prepare management plan  Resolve issues as per Humber Implementation Committee  River Basin Coordinator	---  ---  see Humber River	Don strategy contains a range of actions based on desired level of protection; costs could range up to \$ 1 billion over 10-20 years for highest level  Selection of desired level of protection referred to RAP
4.2.3 (pg. 4-60)	Rouge River	Local Mun. Reg. Mun. MTRCA province interest groups	Local Mun. Reg. Mun. MTRCA province	Draft Strategy released 1989	not determined as yet	Determine Costs and Seek Commitments  Implementation Committee  River Basin Coordinator	---  ---  See Humber River	Rouge approach represents "state-of-the-art" in basin strategy development; strategy needs to be converted into a plan with costs, schedules, and commitments
Remedial Action # 4.3 : Continue to Development and Implement Policies and Guidelines for Stormwater Quality Control								
4.3.1 (pg. 4-71)	Stormwater Policy, Guideline, Manual Development	Province	Province	No Policy for stormwater quality	---	Develop a Policy/Regulation /Strategy for stormwater quality  Develop CSO guidelines	internal resources  internal resources	See also Comp. Action # 4.3.4  main issue is required staff resources for implementation of any policy developed

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**Remedial Intent # 4**  
Reduce the Impacts of Stormwater Runoff

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
4.3.2 (pg. 4-80)	Pilot Stormwater Ponds Program	MOE Local Mun. Reg. Mun.	MOE Local Mun. Reg. Mun. Federal (possible)	Emery Cr. Recommended by TAWMS  not yet initiated	\$ 1.4 mill. (1985 dollars)	Fund up to six pilot projects over next 3 years  Establish multi-agency pilot project implementation teams (NGO participation proposed)	\$ 11 mill. (over 3 years)  no cost	demonstration/research projects in different municipalities  possible federal funding to be determined based on research orientation of projects
4.3.3 (pg. 4-88)	Leaded Fuel Regulations	Federal	Federal	Reduction in use is occurring	---	Elimination of most leaded fuel by Dec. 1990	---	may significantly reduce lead (one of the main contaminants) in stormwater runoff
4.3.4 (pg. 4-92)	Long Range Stormwater Quality Strategy	Province Local Mun. Reg. Mun. MTRCA	Local Mun. Reg. Mun. Province	Urban Drainage Management Program	---	Apply Interim Stormwater Quality Guidelines to new dev.  Conduct PCP studies to Prioritize "retro-fit" sites  Apply Stormwater Quality control to redevelopment  Retro-fit existing problem sites	staff resources to be determined; capital costs - developer  \$ 2 mill.  capital costs borne by developer  to be determined	currently no commitment by any agency to full scale stormwater quality program  major new staff resource commitment required  Projected costs for "retrofit" sites is in the billions of \$  Recommended thrust: new development & redevelopment

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**Remedial Intent # 5**

Increase Public Awareness and Public Involvement in Environmental Programs

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 5.1 : Increase Public Access to Studies and Reports on the Environment and the Metro Toronto RAP								
5.1.1 (pg. 5-2)	RAP Communication Plan	Province	Province	RAP consultation ongoing	\$ 150 K/yr	Development of a Continuing RAP Communications Plan	\$ 75 K/yr	annual progress report newsletters news releases
5.1.2 (pg. 5-7)	RAP Library	Province Federal (possible)	Province Federal (possible)	RAP office, Royal Commission	---	Establish a Metro Toronto RAP Library*  RAP Resource Facility in existing facility*	\$ 110 K/yr  \$ 60 K/yr	stand alone facility with staff  "piggy-back" onto existing facility; staff required but space donated
Remedial Action # 5.2 : Establish a Means of Providing Support to NGOs and Municipalities for Projects which Encourage Public Involvement								
5.2.1 (pg 5-12)	Foundation for Grants	Province	all implementing agencies and municipalities	federal and provincial programs exist but none are specific to the Toronto RAP	---	Foundation for Grants	\$ 150K/yr base budget provided by agencies and municipalities  additional funds based on fund raising and innovative funding mechanisms	arms-length foundation operated by a board drawn from RAP implementers and the public  aim would be to fund citizen sponsored projects or agency projects which are multi-use  further development of the Component Action is required
Remedial Action # 5.3 : Encourage Public Use of the Waterfront and Valleys and Increase Public Involvement in Aesthetic Clean-up Programs								
5.3.1 (pg. 5-16)	Agency Clean-up Programs (SCOUR)	MTRCA	Province	Summer program operated since 1985	variable \$ 40-150 K/yr	Improve existing program funded under the Environmental Youth Corps*  Establish separately funded program*	no additional cost  \$ 100 K/yr	stream and river clean-up program operated voluntarily by MTRCA  new program would require designation of an agency with a mandate for stream clean-up
5.3.2 (pg. 5-22)	NGO Clean-up Programs	Public Groups	Public Groups	Occasional Clean-up days	---	Deferred pending further consultation	---	Non government organizations conduct voluntary valley clean-up

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**Remedial Intent # 5**

Increase Public Awareness and Public Involvement in Environmental Programs

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 5.4 : Implement Stream Improvement and Rehabilitation Projects Which Will Encourage Greater Public Pride in Their Rivers and Waterfront								
5.4.1 (pg. 5-24)	Agency Stream Improvement Programs	MTRCA, MNR	province, municipalities, private landowners	MTRCA/Mun. MNR Don R. (1989)	\$100 K/yr not available \$185 K	Upgrade existing programs	\$ 380 K in year 1  \$250 K/yr thereafter	Stream improvement includes small sediment control works, in-stream habitat work, and tree plantings.
5.4.2 (pg. 5-31)	NGO Programs	Public Groups	Grants, Private donations	Conservation Council Ont.  Black Cr. Project	\$ 325 K approved from Environmental Partners Fund	Encourage NGOs with project orientaion	not costed	seek to establish NGO groups with project orientaion on other watersheds
						Involve NGOs on project implementation committees	no cost/volunteer time by NGOs	further discussion required regarding NGO resources
						Support NGO sponsored initiatives	to be determined	NGOs in process of negotiating matching funds

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**Remedial Intent # 6**

Foster Ecosystem Thinking Both Within and Outside the Metro Toronto RAP

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 6.1 : Encourage Public Awareness and Communications with Other RAPs								
6.1.1 (pg. 6-2)	Communication with other RAPs	RAP Program PACs	RAP Program PAC Budget	Conference Participation (RAP, PAC or IJC sponsored)	Approx. \$10K/yr (all RAPs)	Continue current RAP program  Encourage PAC Submissions	—  volunteer time	PAC reps expenses paid to attend RAP related conferences  PACs can make submissions  PAC budgets also fund expenses
6.1.2 (pg 6-5)	PAC Network	RAP program PACs	RAP Program PAC budgets	NGO networks, newsletters	---	Further discussion required	---	Currently non government organizations operate networks, provide newsletters, reports; RAP initiative should not duplicate
Remedial Action # 6.2 : Ensure Toronto Public is Kept Informed of Progress on Initiatives Outside the Toronto RAP								
6.2.1 (pg. 6-7)	Lake Ontario Toxics Management Plan	Canada, US, Ontario, New York	Canada, US, Ontario, New York	Feb. 1989 report  Ongoing Program	---	Continue current research	---	a presentation was made to PAC in 1989  periodic briefings on progress are to be provided in future
Remedial Action # 6.3 : Upgrade the Level of Environmental Input to Planning Processes								
Appendix A	Seminar Summary			Two day seminar Feb/89	---	Continue to provide a forum for discussion	---	encourage discussion and action by agencies with a planning mandate
Remedial Action # 6.3 : Ensure Greater Coordination of Planning on a Watershed Basis								
6.4.1 (pg. 6-15)	MTRCA Greenspace Strategy	MTRCA	Province, Municipal	Greenspace Plan (Jan/89)	---	Oak Ridges Moraine Watershed Management Waterfront Outdoor Recreation	\$10 mill/yr \$0.3 mill/yr \$3.1 mill/yr \$1.9 mill/yr	Costs are for programs throughout MTRCA jurisdiction  Many elements of Greenspace strategies are outside RAP mandate  Plan represents an example of a single agency taking a lead in coordination on a watershed basis

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**Remedial Intent # 7**  
Conduct Research in Support of Short and Long Term RAP Implementation

Component Action #	Description	Responsibility		Current Status		Potential Improvements	Costs	Comments
		Implementor	Funding	Programs	Costs			
Remedial Action # 7.1 : Complete Studies Initiated Through the RAP in Order to Complete the Information Base								
7.1.1 (pg. 7-4)	Toxic Contaminants Study	MOE	RAP	Under way	\$ 470 K (1988-89)	sample additional priority outfalls and tributary loads	\$ 260 K (1990)	toxic loads from storm sewers and CSO (due 1991)
7.1.2 (pg. 7-8)	Fate and Transport Modelling	Federal	RAP	Existing model for Main STP	---	upgrade model and improve loading estimates	\$ 85 K (1990)	dependent upon Toxic Contaminants Study
7.1.3 (pg. 7-11)	Sediment Study	MOE	RAP	Preliminary Studies Completed	---	electromagnetic conductivity monitoring	\$ 68 K	likely to be deferred because of budget constraints
7.1.4 (pg. 7-14)	Biomonitoring Research (1989)	MOE	RAP	Ongoing	---	exposure regimes for PCB's	---	combined with # 7.1.1 report due 1991
7.1.5 (pg. 7-16)	Funding Mechanisms Study	RAP Steering Committee	COA RAP (study only)	Under Development	---	modifications and additions to existing funding mechanisms	to be determined	report due July 1990; determine alternate funding options
7.1.6 (pg. 7-19)	Fish Community & Habitat Monitoring	MNR MTRCA	RAP (1989) MNR (future)	Year 1 field work complete	\$ 93 K	Continue 5 year program	1990-93 \$50K/yr 1994 : \$95K	continuation depends on MNR funding (status uncertain)
7.1.7 (pg. 7-22)	Monitoring/Airbourne Toxic Chemicals	MOE	RAP	Ongoing	---	Continue program; Station purchased in 1989	\$ 50 K/yr	Toxic loads from atmosphere needed for fate and transport modelling
Remedial Action # 7.2 : Complete Studies Initiated as a Result of Other Programs Which Will be of Assistance to RAP Implementation or Decision Making								
7.2.1 (pg. 7-25)	MISA (direct dischargers)	MOE	MOE Industry	Ongoing	variable by sector	---	---	provincial program to reduce discharge of toxic substances
7.2.2 (pg. 7-26)	MISA Pilot Site Toronto Main STP	MOE	MOE	Preliminary Studies Completed	---	---	---	MISA pilot site report expected in 1990
7.2.3 (pg. 7-27)	Contaminant Residue in Aquatic Biota (CRAB) Guidelines	MOE	MOE	Ongoing	\$ 10 K FY/1990-91	---	---	draft of procedures by autumn 1990
7.2.4 (pg. 7-29)	PWQO Revisions	MOE	MOE	Underway	\$ 429 K 10 man years	94 substances - FY 1989-90 46 substances - FY 1990-91	---	Provincial Water Quality Objectives (PWQO)

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